



TRANSPORTATION MASTER PLAN

City of Terrace

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Contact: Chris Cordts
Engineering Supervisor, City of Terrace
250 615 4042
ccordts@terrace.ca

McElhanney Consulting Services Ltd.
1 - 5008 Pohle Avenue
Terrace BC V8G 4S8
www.mcelhanney.com



EXECUTIVE SUMMARY

The City of Terrace has remained at a stable population of approximately 12,000 for many years. However, new forecasts predict a potential 50% increase in population over the next 10 years based on local economic growth associated with mines, port expansions, energy transmission, and a proposed 2,400 acre industrial park near the regional airport. To address this growth, and to complement recent community planning studies and bylaw updates, the City has commissioned this *Transportation Master Plan*. The objective of the Plan is to provide direction to the City of Terrace for the planning, design, and management of the transportation system improvements to accommodate the expected city growth, while being consistent with the Community Vision and goals for sustainability.

The study began with the compilation of relevant background from recent city plans, maps, strategies and policies. This was followed by comprehensive community engagement, including two stakeholder meetings and a public open house (February 2016), and an online public survey. The survey asked 14 questions about the transportation system, and priorities for improvement. In total, 319 responses were received (i.e. almost 3% of the population), with even representation from all neighbourhoods in the city. The survey results indicated that a large proportion of the respondents considered the following projects as “High” or “Very High” priorities:

1. Upgrade of Lanfear Drive (64%)
2. New pedestrian / cycle overpass over CN rail line (47%)
3. Upgrade of Skeenaview Drive (46%)
4. New vehicular overpass at Kalum Lake Road (45%)
5. Upgrade of Lakelse Avenue / Sparks Street intersection (45%)
6. Upgrade of Lakelse Avenue / Eby Street intersection (45%)
7. Downtown Street Lane Improvements (38%)
8. Upgrade of Thomas Street / McConnell Avenue intersection (31%)

To evaluate how the increase in population would affect the transportation system, future traffic patterns were estimated based on existing traffic counts at 27 key intersections, and the expected city growth in the Keith Estates and Upper Bench neighbourhoods. The analysis was used to revisit the functional classification of the Terrace network, and to identify issues with the performance of major road corridors and intersections. The results indicated that most of the Terrace road network would manage the expected city growth with acceptable Levels of Service. Key concerns were the capacity of roads connecting to the Upper Bench (e.g. especially Lanfear Drive), the need for a new road link across the CN rail line, and operational issues at 12 intersections of various priorities.

The past five years of ICBC claims data (2008 to 2013) was analyzed to evaluate the safety performance of the Terrace road network. The safety analysis confirmed that collisions are generally proportional to traffic volumes (as expected), and that winter conditions are a significant contributing factor. Also, nearly half of all reported collisions were related to parking manoeuvres.

The safety analysis also identified and evaluated the collision trends at the Top 20 locations (based on collision frequencies, rates, and severities). The top non-highway location in Terrace was found to be the intersection of Keith Avenue / Kenney Street, which warrants a four-way stop.



To complement the technical analysis, the Transportation Master Plan included high-level discussions of the following:

- Downtown Transportation: to improve traffic flow, the four lane sections of Kalum Street and Lakelse Avenue should be converted to three lanes. Also, more bike lanes and traffic calming measures are recommended to improve the Downtown for active transportation.
- Pedestrian and Cycle Network: the four identified priorities are (a) a grade-separated crossing of the CN rail line; (b) improved connections to the Upper Bench; (c) a formal trail crossing at the bottom of Lanfear Drive; and (d) an improved trail connection between Terrace and Thornhill.
- Transit System: the routes, schedules, on-street infrastructure, and local transit policy should be revisited in consideration of the future ridership expected with city growth.
- Truck Routes: Keith Avenue is a good candidate for a parallel truck route, and is currently used by heavy truck traffic now. However, this route should not be formalized as a truck route (with associated regulations and enforcement) until Keith Road is upgraded, and a new CN overpass is constructed to eliminate at-grade rail crossings.
- Traffic Calming Measures: the City can implement a number of road improvements to help reduce traffic speeds in residential and commercial neighbourhoods, including horizontal constraints, vertical deflections, and intersection treatments.
- Transportation Demand Management (TDM): to reduce the demand for vehicular traffic, there are a number of initiatives that are effective and appropriate in northern BC communities, including improvements to the active transportation and transit systems, and development incentives.

The Transportation Master Plan recommendations were prioritized into short, medium and long term improvements (Figure ES-1). The top priorities for major network improvements were a new rail overpass at Highway 16 / Kalum Lake Road, a new pedestrian overpass at the east end of the CN yard (with associated upgrades to the trail connections), the upgrade of Lanfear Drive, the four-way stop at Keith Avenue / Kenney Street, and the lane diets in the Downtown.

A number of recommendations for further study, and general system and policy initiatives, were also provided. These included the continued implementation of the Active Transportation Plan recommendations, the continued efforts to improve accessibility, a comprehensive Transit System Study, and a Downtown Parking Study.

There are a number of sources available for funding the recommendations of the Transportation Master Plan, such as senior government grants, ICBC cost sharing of road safety improvements, city bylaws to facilitate Local Area Service agreements and developer contributions, and other public/private partnerships.

Depending on the rate of growth which occurs in Terrace, the findings of this study should be revisited within the next 5 to 10 years.

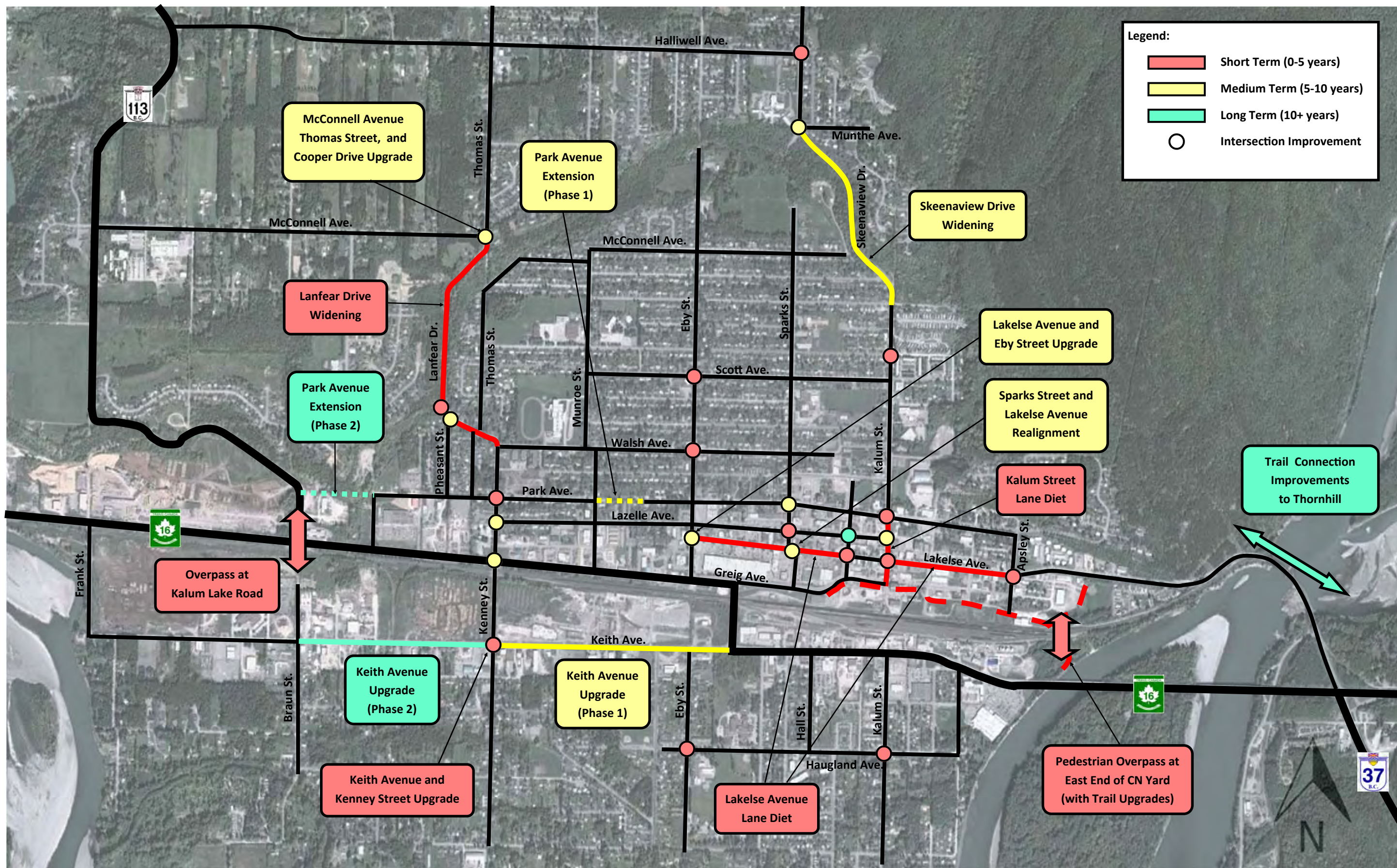


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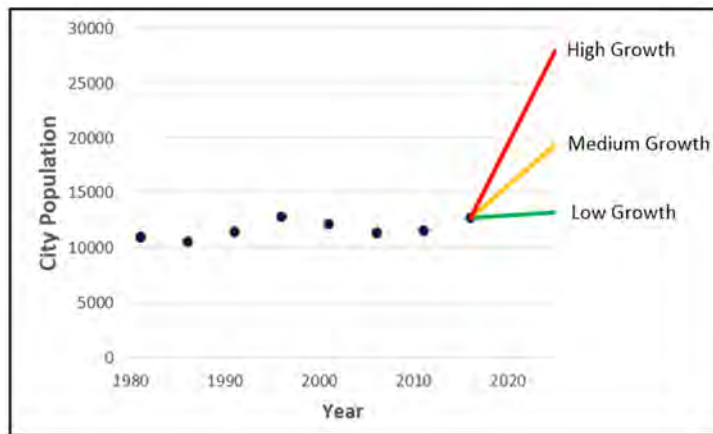
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1 INTRODUCTION

1.1 BACKGROUND

As the major urban centre in the Kitimat-Stikine District, the City of Terrace has remained at a stable population of approximately 12,000 for the past three decades. However, a recent economic study forecasts a population increase of over 50% over the next 10 years as a medium growth scenario (Figure 1). This growth is based on the assumptions of up to three new mines in the region, port expansions, energy transmission (e.g. Liquefied Natural Gas (LNG), and hydro), and the new 2,400 acre Skeena Industrial Development

Park proposed within the airport lands.



In response to this expected growth, the City has updated the Zoning Bylaw and the Official Community Plan, and has commissioned an Infrastructure Scoping Study, an Active Transportation Plan, and a Parks and Recreation Master Plan.

Figure 1: City Population Forecasts

(Sources: Statistics Canada; Big River Analytics)

To complement this recent planning work, the City commissioned the Transportation Master Plan (the “Plan”). This Plan is intended to align with the Official Community Plan objectives (Table 1), and provide City staff with a prioritized list of effective, affordable, and achievable road network improvements to ensure the city can accommodate the expected growth. In this respect, the Plan must be the foundation on which to respond to development pressures (e.g. Keith Estates, etc.) to ensure the principles of safety, connectivity, mobility, sustainability, and economic viability are preserved. In addition, the Plan shall identify and address existing network issues (e.g. geometric challenges, road capacity constraints, and deficiencies in the active transportation network) to ensure these facilities can safely accommodate the increase in user demands.

This report summarizes the research, consultation, technical analysis, and recommendations of the study, and provides the City with comprehensive and dynamic Plan for use in developing capital programs, negotiating with local developers and industry, and applying for cost-sharing opportunities.

Table 1: Relevant Objectives from the Official Community Plan

OCP Objective	Comments
<i>Build roads and develop infrastructure to meet our current needs within our means.</i>	All recommended system improvements must be viable, cost-effective, and technically feasible. Larger projects may require senior government or private investment partners
<i>Take a long-term and holistic perspective on all infrastructure upgrades, including the consideration of lifecycle costs, sustainability and regional benefits.</i>	The Plan is based on the principles of sustainability, addressing the existing growth projections while considering the long term costs and implications. Effective solutions may extend beyond physical infrastructure, also considering Transportation Demand Management (TDM) initiatives which can delay or offset the need for costly investments.
<i>Local economic viability and vitality.</i>	To support the local economy, the Plan addresses issues with road network capacity. Traffic needs to flow safely and efficiently to support the transport of goods to, from, and within the community.
<i>A thriving Downtown.</i>	The Plan considers how the road network affects the Downtown as a space for people, beyond just the accommodation of automobiles (i.e. “Complete Streets”)
<i>Neighbourhoods and districts across the City shall be linked to provide safe walking, cycling and efficient public transit opportunities to residents.</i>	Discontinuities in the Active Transportation Network are identified and addressed to ensure neighbourhoods are effectively connected to reduce the community reliance on motorized transportation (e.g. multi-modal grade-separated crossings of the railway tracks).
<i>Improve the safety and available modes for active transportation users.</i>	To be effective and attractive for users, the Active Transportation System must be safe, reliable, accessible, and integrated.
<i>Maintain and protect a high level of air quality.</i>	By addressing issues with peak hour congestion, and by inviting shifts in local travel behaviour, the Plan can help reduce vehicle emissions.
<i>Support active citizens and provide ongoing opportunity for engagement.</i>	The Plan actively engages local residents and stakeholders to ensure all issues are identified, improvement opportunities are explored, and the final Plan is supported by the community.

1.2 COMMUNITY PROFILE

The City of Terrace covers an area of 57 km², which is divided into four areas (Figure 2): the City Centre, bounded by the Bench to the north and the railway tracks; South Terrace, bounded by the railway tracks and the Skeena River; the Upper Bench, located in the north of the city; and the Airport Lands, which are under the jurisdiction of the municipality, but have generally been omitted from the scope of this study.



Figure 2: Areas of Terrace

From a demographic perspective, Terrace is a young city relative to the rest of the province (Figure 3). Consequently, with the pressures of commuting for school and employment, the relatively low population density, and the winter climate, Terrace has become strongly reliant on the passenger vehicle as the primary mode of transportation (Table 2).

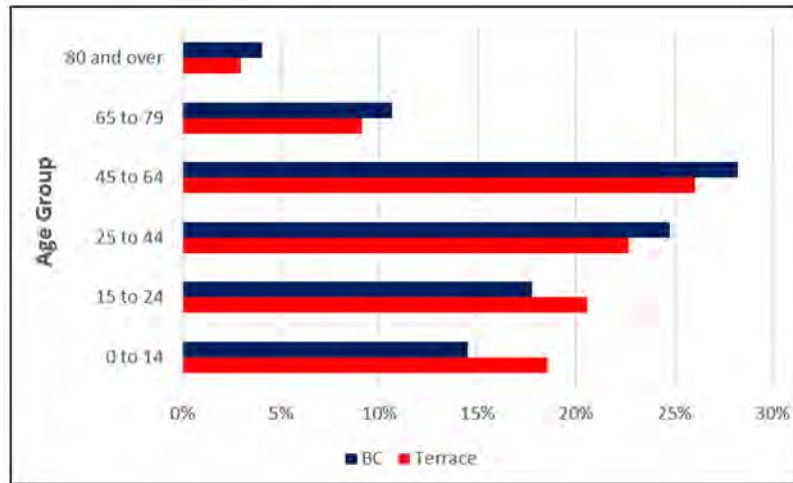


Figure 3: Age Demographics in Terrace versus BC

Table 2: Transportation Modes in Terrace versus BC

Transportation Mode	Terrace	B.C.
Car, Truck or Van as Driver	74%	72%
Car, Truck or Van as Passenger	11%	8%
Public Transit	1%	10%
Walk/Bicycle	13%	9%
Other	1%	1%

(Source: Statistics Canada, 2006 Census)

The challenge of the Transportation Master Plan is to safely address the expected future traffic demand while providing the opportunities and encouragement for citizens to choose more sustainable modes of transportation.



Figure 4: Terrace

1.3 OBJECTIVES

The objectives of the Transportation Master Plan are:

1. To be consistent with the Community Vision, as well as other recent planning and policy documents concerning City development and the transportation system;
2. To provide direction to the City of Terrace for the planning, design, and management of the transportation system improvements necessary to accommodate the expected population growth over the next 10 years; and
3. To support the community's sustainability goals in the implementation of the Transportation Master Plan.

1.4 SCOPE AND METHODOLOGY

The development Transportation Master Plan was comprised of the following scope:

1. A review of all relevant background literature concerning community development, population forecasts, plans and policies.
2. Comprehensive public and stakeholder consultation, including meetings with key agencies and user groups, a public open house, and an online survey.
3. Transportation Demand Forecasting to identify and analyze the expected growth in traffic volumes and changing traffic patterns in Terrace.
4. Classification of the road network, and analysis to identify deficiencies such as road capacity constraints, inadequate road laning/geometry, and necessary changes to traffic control.
5. Traffic safety analysis, including identification of trends in local collisions, and a Network Screening to determine and analyze the Top 20 intersections of concern (and determine solutions to reduce the risk of collisions at those locations).
6. Review of local issues and plans concerning active transportation (i.e. walking, cycling, and transit).
7. Identification, analysis, and selection of options to address the identified issues.
8. Development of an Implementation Plan to prioritize the implementation of the recommendations in a cost-effective and sustainable fashion.

2 LITERATURE REVIEW

Different aspects of the Terrace transportation system have been studied for the past few years. Recent plans, studies, and City policy documents have relevance to the development of Transportation Master Plan, as summarized below.

2.1 OFFICIAL COMMUNITY PLAN

The City of Terrace Official Community Plan (OCP) Bylaw No. 1983 (2011) outlines the policies and objectives for the future development of Terrace. At the time of writing (2009), the OCP predicted an annual population growth of 0.8% in the coming years, which followed the trends of the past 40 years. More recently, the population has been estimated to grow by up to 30% over the next 10 years due to forecasted investment and economic activity.



Key policies from the OCP include:

- Develop a family friendly downtown core through a focus on enhancing the pedestrian experience and public spaces.
- Consider designating a transport vehicle route on Keith Avenue to enable smooth traffic flow.
- Maintain unimpeded vehicle and pedestrian access north-south across the railway corridor.
- Balance the provision of vehicle parking in the downtown while increasing opportunities for active transportation.
- Promote an accessible and affordable transportation system. Public pedestrian routes to be designed and constructed for accessibility, when feasible.
- Pedestrian routes such as sidewalks, crosswalks and intersections shall be easily identifiable and clearly distinguished from vehicular routes.
- Continue to build active transportation connections within Terrace and between adjacent communities.
- Work with community partners, such as RCMP and ICBC, to raise community awareness and establish a culture of shared roadways for all modes.
- Support the implementation of cycling education programs in schools and provide information regarding rules of the road related to cycling etiquette and helmet use.
- Support the enhancement of the cycling network and the pedestrian network including sidewalks, pathways and trails.
- Increase the number of bicycle parking areas and bike racks in downtown public spaces and on commercial properties as a condition of the development permit.
- Work with BC Transit to undertake a ridership survey to improve levels of service, such as frequency and route selection, and to 'right-size' the transit system.
- Support BC Transit in accommodating the mobility requirements of all transit users.
- Coordinate with BC Transit for the provision of appropriate benches, shelters, posted schedules, trash receptacles and other features at transit stops.

2.2 SUBDIVISION AND DEVELOPMENT BYLAW

According to Section 3.8 of the Subdivision and Development Bylaw No 1591-1997, the purpose of the bylaw is to "... guide the natural growth of the City in a systematic and orderly way for the ultimate benefit of the community as a whole...". Sections of the bylaw of relevance to the Transportation Master Plan include:

- The street alignment shall be sufficient and suitable for the anticipated traffic volume and land contours, not only within the area being subdivided, but to the street system already established or which may be required to provide access to the lands lying beyond or around and to the general street pattern of the City;
- Where required by the Official Community Plan and/or the Park Plan, walkways shall be dedicated and constructed to provide convenient pedestrian circulation or access to and from schools, playgrounds, shopping areas, watercourses, community facilities and other transportation routes such as cul-de-sacs prior to subdivision approval or building permit approval.
- Where required by the Official Community Plan and/or the Park Plan, bicycle paths shall be dedicated and constructed to provide convenient cyclist circulation or access to and from schools, playgrounds, shopping areas, watercourses, community facilities and other transportation routes such as cul-de-sacs prior to subdivision approval or building permit approval.
- The City shall require development applicants to provide transit bays, traffic signals and other traffic control where deemed necessary by the City or a Traffic Impact Study.
- All works and services required for subdivision or development under the bylaw shall be designed and installed in accordance with Schedule "H" of the bylaw.
- Section 00500 of Schedule "H" outlines the design criteria for highways (i.e. streets and roads), intersections, walkways, bicycle paths, transit bays, and traffic control in Terrace.

2.3 STREET AND TRAFFIC BYLAW

The Terrace Street and Traffic Bylaw No. 1313 (2002) outlines the regulations for the control of traffic, pedestrians, cyclists, and parking in Terrace. A number of these are of interest to the Transportation Master Plan, including the regulation prohibiting pedestrians from crossing the street except at marked or unmarked crosswalks, i.e. "jaywalking" (Clause 5.7); prohibiting cyclists from using the sidewalk (Clause 15.1); and prohibiting roller bladers and skateboarders from using the streets or sidewalks (Clause 15.3).

2.4 TERRACE 2050

The Terrace 2050 report (2009) outlines the community strategy for sustainability, based on comprehensive stakeholder consultation. The document formulates nine Strategic Directions intended to guide the development of subsequent planning studies and policy updates (e.g. Official Community Plan). The eighth strategy is to “*provide a network of safe and convenient pedestrian paths, bikeway and transit routes that lessen dependence on driving*”, which in turn improves public health and reduces greenhouse gas emissions. The three objectives arising from this strategy are to (a) maintain walking and cycling networks throughout the city; (b) promote the transit system; and (c) increase awareness of alternative modes of transportation. The study helped initiate the subsequent Active Transportation Plan.



2.5 TRANSPORTATION (HIGHWAY 16) CORRIDOR STUDY



In 2009, CN Rail was considering the closure of the Kenney Street at-grade rail crossing. In response, the City, MoTI, and ICBC jointly commissioned the Terrace Transportation Corridor Study to identify grade-separated solutions along Highway 16. The study findings included the need for future laning, geometric and traffic control improvements on the existing Sande Street overpass. Three new options for grade-separated rail crossings were identified at Kenney Street, Kalum Lake Road, and Brooks/Blakeburn Street. The Kenney Street crossing was favourable from the perspective of the economic and technical analysis, while the Kalum Lake Road crossing was favoured by the public. The three options were all considered viable, and were recommended for future consideration; however, the study also argued against further consideration of grade-separated crossings at Kalum Street (due to the presence of the rail yard), and at Frank Street (due to the limited benefits from this remote location).

A concurrent review of the local collision statistics revealed no significant collision-prone locations on Highway 16. The most collision-prone intersection was found to be Keith Avenue at Kenney Street.

No changes to the local truck routes were recommended. The primary and secondary truck routes were considered to be appropriate for the existing network. However, the truck route network should be updated at the same time as any new grade-separated rail crossings are implemented.

Other recommendations from the study included the need to revisit traffic control at the Eby Street/Lakelse Avenue intersection, the need for new sidewalks along Keith Avenue, and the potential extension of Park Avenue to Kalum Lake Road (i.e. as part of the Kalum Lake Road overpass option).

2.6 HIGHWAY 16 CORRIDOR STUDY

The Ministry of Transportation and Infrastructure (MoTI) commissioned a study of Highway 16 in 2015, which included the corridor through Terrace (Figure 5). This study was in progress during the development of the Transportation Master Plan.



Figure 5: Highway 16 Corridor Study Limits

In a series of memos, some early draft findings from the analysis included the following:

- The peak hour traffic operation along Highway 16 is generally at acceptable Levels of Service, except for the intersection of Sande Street / Keith Avenue (which was subsequently converted to a signalized intersection), and the intersection of Highway 16 / Highway 37.
- The existing truck routes (especially Keith Avenue) are effective at diverting industrial traffic around the Downtown area.
- An evaluation of the collision statistics from MoTI's Collision Information System (CIS) was completed using data from 2009 to 2013. The evaluation concluded that there was an abnormal spike in collisions in 2012. However, the collision rates were below the provincial averages for similar highway facilities. The intersections with the highest collision rates were Highway 16 / Kenney Street and Highway 16 / Kalum Street.
- Although both the Northwest Community Readiness Project and BC Statistics estimate the future annual population growth rate in Terrace to be less than 1%, the Highway 16 Corridor Study used three more aggressive growth scenarios: 1.5% (low scenario), 2.0% (moderate scenario), and 3.0% (high scenario).
- Based on the assumed growth rates, unacceptable Levels of Service (LOS F) are predicted during the 2025 and 2040 peak hours at Highway 16 (Sande Street) / Keith Avenue (based on the previous traffic control); and Highway 16 / Hall Street.

- A closure of the Old Skeena Bridge would exacerbate the 2040 performance of the highway intersections between Sande Street and Highway 37.
- An eastbound left turn lane is not warranted at the Highway 16 / Kalum Lake Road intersection for the foreseeable future.
- Short term signage improvements should be installed on the Highway 16 bridges to improve safety for pedestrians and cyclists traveling to and from Ferry Island and Thornhill. Long term strategies are required to improve these links.
- Access to private development (esp. commercial) should be provided via side streets wherever possible, rather than the Highway.

2.7 TERRACE INFRASTRUCTURE UPGRADE SCOPING STUDY

The 2015 Infrastructure Upgrade Scoping Study involved a high-level planning analysis of the road and servicing improvements necessary to accommodate the expected population growth in Terrace over the next 10 years. The road improvements included the following:

- CN Rail overpass at Highway 16 / Kalum Lake Road, and associated upgrade of Braun Street;
- Upgrade of Lanfear Drive;
- Upgrade of Skeenaview Drive;
- Upgrade of Keith Avenue; and
- Upgrade of Park Avenue, and extension to Kalum Lake Road.



The report provided conceptual designs and preliminary cost estimates for each improvement. To help pay for these improvements, the report provided a case for Development Cost Charges, whereby developers would pay a pre-determined fee toward major city infrastructure improvements.

2.8 TERRACE POPULATION SURVEY AND PROJECTIONS

Using a local population survey from 2015, this economic study projected the future community population to the 10 year horizon in three separate scenarios: low growth, medium growth, and high growth. Under the medium growth scenario (considered the most likely by the City), the population would increase from 12,494 in 2015 to 19,363 in 2025. This increase is based on the assumptions of ten new manufacturing facilities in the Skeena Industrial Development Park, three regional mines, and two LNG facilities.

2.9 DOWNTOWN DESIGN GUIDELINES

As Appendix C to the City of Terrace Official Community Plan, the Downtown Design Guidelines were created in recognition of the unique and important role provided by the Downtown, and to guide the development of the Downtown Neighbourhood in a consistent, attractive, and people-friendly fashion. The guidelines mainly focus on

site/building design, landscaping and streetscaping requirements. Some key guidance that affects the Transportation Master Plan includes:

- On-street parking is permitted and encouraged on local streets to reduce on-site parking requirements.
- The commercial core should have a pedestrian focus; all streets should incorporate wide and safe pedestrian areas.

2.10 DOWNTOWN PLAN

As Appendix G to the City of Terrace Official Community Plan, the Downtown Plan was initiated in 2006 to “... *provide a comprehensive vision for the downtown area,*” which included establishing a functional and visual sense of place through design strategies; creating a thriving economic, cultural, and historic centre for the community; and encouraging investment and redevelopment in the Downtown neighbourhood. The defined Downtown area is shown in Figure 6.

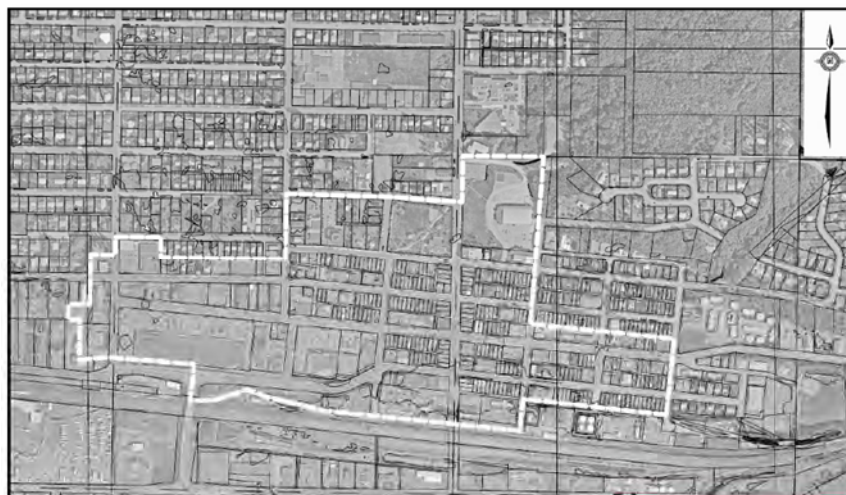


Figure 6: Downtown Revitalization Plan

Source: *Terrace Downtown Plan, EBA Engineering, 2007*

Some of the relevant findings and recommendations are as follows:

- With reference to the 1998 Downtown Assessment, the Plan confirms five official gateways to the Downtown: Hwy 16 / Sande Street (south); Hwy 16 / Eby Street (west); and Lakelse Avenue / Apsley Street (east); George Little Park / Kalum Street (north); and the VIA Rail Station on Kalum Street.
- The City should endorse a unified streetscaping design for the Downtown.
- Sidewalks should be widened wherever feasible, even by the reduction in traffic lanes. Sidewalk extensions (or “bulb-outs”) should be used at the Downtown intersections and crosswalks where appropriate to reduce traffic speeds and reduce pedestrian crossing distances.
- Bicycle racks should be installed at approved locations Downtown, potentially as part of a sponsorship program.

- The City should commission a Downtown Parking Plan to investigate ways to increase opportunities for on-street parking, and to reduce off-street parking requirements.
- Traffic calming should be considered on streets in the Downtown to reduce traffic speeds, and improve the safety and comfort of vulnerable road users.

2.11 KEITH ESTATES NEIGHBOURHOOD CONCEPT PLAN



The City of Terrace commissioned the Keith Estates Neighbourhood Concept Plan (NCP) in 2014 as a high-level planning exercise to generate land use ideas for the redevelopment of the 29 hectare industrial site south of Highway 16, between Sande Street and Blakeburn Street. The study was developed in consideration of the expected surge in local population, and the opportunities Keith Estates may afford to accommodate that surge.

The study recommended that the NCP include a mixed-use of commercial, residential, institutional and industrial activities. The west of the site would be more commercial and industrial uses, with residential uses further east.

A linear park is proposed to buffer the neighbourhood from the railway tracks. The development summary is outlined in Table 3.

Aside from identifying potential land use plans and determining preliminary estimates of future traffic volumes, the study identified the following necessary improvements:

- Signalization of Keith Avenue / Sande Street (subsequently implemented);
- Improved transit service to the area when warranted by demand; and
- Sidewalks on Keith Avenue, with a separate pathway for cyclists along the north side of the road.

Table 3: Keith Estates NCP Development Summary

Keith Estates NCP Development Summary <i>(all numbers are approximate)</i>					
Sector	Light Industrial (floor area m ²)	Commercial (floor area – m ²)	Institutional (floor area- m ²)	Residential (# units)	
				apartment	townhouse
West	21,900-27,400 m ²	3,700-9,100 m ²	1,800-3,700 m ²	-	-
Central	3,500-4,700 m ²	8,200-10,600 m ²	Up to 2,400 m ²	210-250	40-50
East	n/a	5,100-7,700 m ²	2,600-5,100m ²	370-420	40-50
Subtotal				580-670	80-100
Total	25,500-32,100 m ²	17,000 -27,400 m ²	4,400-11,200 m ²	660-770 units	
			Population	1,700-1,900 people ¹⁸	

Source: Keith Estates Neighbourhood Concept Plan, Urban Systems, 2014

2.12 AIRPORT LANDS AREA CONCEPT PLAN

The Terrace Airport Lands Area Concept Plan (2008) outlines the development criteria and objectives of the existing and future expansion of the airport lands (a total study area of 2,320 ha). The Plan (shown in Figure 7) identifies the vision for the airport lands as follows: “The airport and surrounding lands will provide a major employment centre, providing a wide range of types of employment for the region, focusing on the excellent integrated transportation network, the developability of the land and the strong partnerships working together to service and develop these areas.” The Plan recommends a balance between the economic development in the airport lands and the rest of the city, with larger parcels for business and industry focused in the airport lands.

The primary access to the airport lands will be via Highway 37. Collector roads within the future subdivisions will have a minimum 30 metre right-of-way, and a 10 metre wide paved surface. Internal (local) roads will have a minimum 20 metre right-of-way, and an 8 metre wide paved surface. Furthermore, a system of 3 metre wide trails shall connect the development sites to the open space corridors.

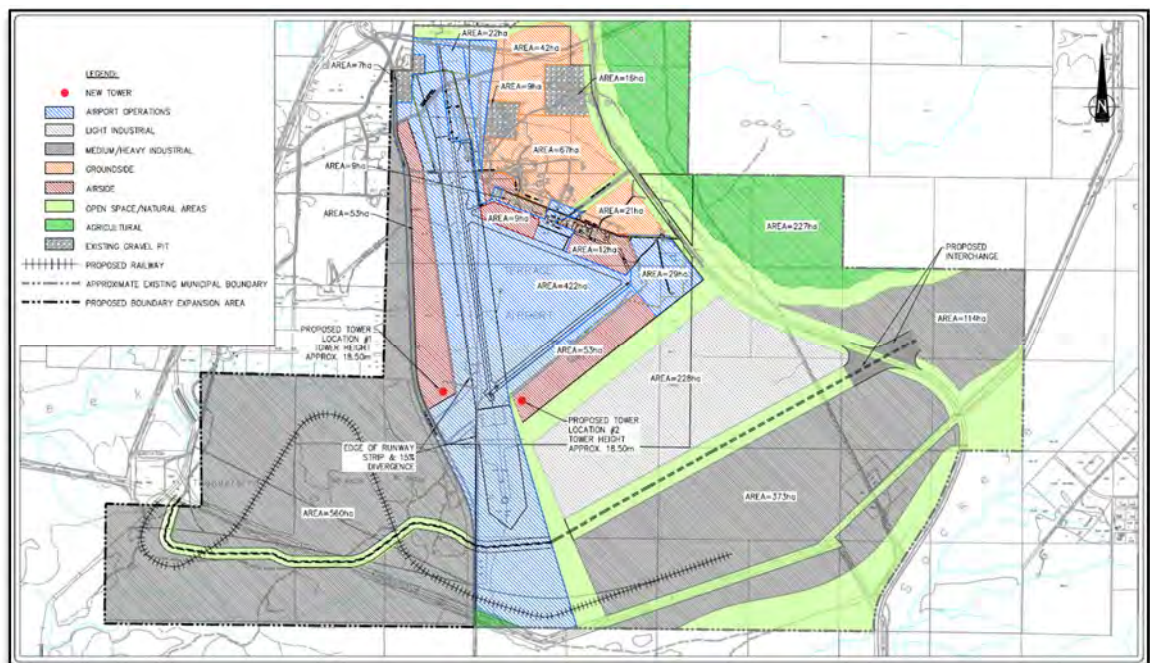


Figure 7: Airport Lands Area Concept Plan – Proposed Land Use
(source: Terrace Airport Lands Area Concept Plan)

2.13 ACTIVE TRANSPORTATION PLAN

The City commissioned the Active Transportation Plan in 2009 to improve the safety and connectivity of the active transportation network, to encourage more residents to partake in active transportation, and to ultimately reduce the greenhouse gas emissions through shifting trips to more sustainable modes. The Plan recognized that the size and layout of the city allow shorter trips, which are conducive to active transportation.



The study identified the major barriers to active transportation in Terrace as:

- the lack of facilities to cross the river (i.e. to Thornhill),
- the lack of safe opportunities to cross the CN rail line, and
- the safety and accessibility concerns with the trail facilities on Skeenaview Drive and Lanfear Drive.

The study provided the following recommendations of relevance to the Transportation Master Plan:

1. Widen the sidewalk on the Old Skeena Bridge to accommodate bi-directional cycle traffic, or other options to improve the use of the bridge for cyclists.
2. Improve the gravel shoulders on the north side of Lakelse Avenue, and create a multi-use path on the south side of Lakelse, to connect Apsley Street and the Old Skeena Bridge.
3. Construct a multi-use trail underpass under the west end of the New Skeena Bridge on Hwy 16.
4. Construct a pedestrian/cyclist overpass across the CN yard at Kalum Street.
5. Construct staircases to the Upper Bench at Eby Street and Thomas Street.
6. Consider upgrading the Howe Creek trails with paving and regrading for accessibility.
7. Install a controlled crosswalk with associated traffic calming at the bottom of Lanfear Drive.
8. Add more sidewalks on the arterial and collector roads, especially around schools.
9. Complete a trail along the river to create a continuous loop around the south half of the city.

2.14 GRAND TRUNK PATHWAY MASTER PLAN

The Grand Trunk Pathway Master Plan was completed in 2008 to establish the planning and design for the pathway on the south side of Highway 16, connecting Kalum Street to the Kitsumkalum River on the west side of Terrace (4.8 km total). The scope of the Plan continued from the existing Millennium Trail (Kalum Lake Road to Eby Street) for a total cost of \$1.9 Million.

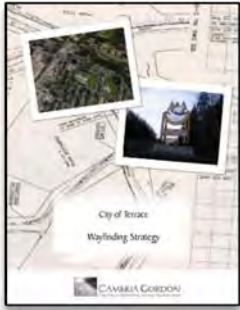


The Plan outlined the trail design specifications, including recommendations for surfacing, signage, lighting, benches, landscaping, and other amenities. Since the completion of the Plan, the trail has been extended west to Frank Street.

2.15 TERRACE HOUSING ACTION PLAN

The Northern Development Initiative Trust initiated the Terrace Housing Action Plan in 2014 to address concerns about providing enough housing in anticipation of the expected economic growth, particularly from the natural gas sector. The majority of the report focused on ways to accommodate low income housing, and includes recommendations for secondary suites in all zones and other higher density residential development initiatives.

2.16 WAYFINDING STRATEGY



The Wayfinding Strategy was commissioned by the City of Terrace in 2010 to facilitate guidance to the city's trails, facilities and other attractions for both residents and tourists. The two directional tools identified in the study were pole signs (indicating directions and distances to key destinations) and kiosks (providing maps and community information).

The study recommended a number of short and long term wayfinding improvements, largely situated around the city core.



Figure 8: Old Skeena Bridge

3 PUBLIC AND STAKEHOLDER CONSULTATION

3.1 STAKEHOLDER MEETINGS

Two stakeholder meetings were held at Terrace City Hall on Wednesday, February 10th and Thursday, February 11th, 2016. The first meeting was with government agencies, and the second was with identified user groups. A third meeting was held with City Council and staff at the Committee of the Whole on Wednesday, February 10th, 2016. Those individuals who were unable to attend one of the meetings were invited to provide feedback in writing afterwards.

The combined comments from these three meetings are summarized below. The detailed minutes of each meeting are included in Appendix B.

3.1.1 *Downtown Terrace*

1. Eby Street / Lakelse Avenue has atypical traffic control (i.e. free flow traffic from the stem of the T intersection), and experiences peak hour delays and queuing issues. However, the intersection operates well for local residents who understand the traffic control. A roundabout may be a potential solution, with its safety and aesthetic advantages. However, the laning and the spacing with Lazelle Avenue would have to be addressed.
2. Eby Street / Lazelle Avenue: the lane drop on Eby just north of this intersection causes northbound vehicles to move into the lane serving the left turn from Eby into Lazelle, prior to this intersection. This conflicts with traffic exiting Lakelse also making this left turn.
3. The offset “T” intersection at Lakelse Avenue / Sparks Street should be realigned, if possible, to create a four leg intersection. This will reduce traffic delays, but would be a costly improvement.
4. The south transition of the Kalum Street Two-Way Left Turn Lane can be confusing. The left lane moves right, but has right-of-way. These paint markings should be revisited. Also, the lane diet can create blind spots in the middle lane, especially at pedestrian crosswalks. The crossing distance is relatively long, and pedestrians don’t always follow the rules, nor cross in designated locations. In rain or darkness, it is difficult to see the pavement markings. In-laid thermoplastic may be a viable solution.
5. Lakelse Avenue: there is a lot of activity around the Skeena Mall, including four lanes of traffic, frequent turning conflicts (especially at Tim Hortons), on-street parking, and a mid-block pedestrian crosswalk. Many pedestrians are not watching for traffic when they cross. A lane diet may improve the situation, if the traffic volumes, bus routes, and left turn demand permit. Education is key. Improved overhead lighting, or pedestrian-activated flashing lights would help make this crossing safer.
6. Lazelle Avenue and Lakelse Avenue could be developed as a one-way couplet, which would improve traffic flow and safety. However, traffic circulation and wayfinding downtown would then be more challenging. This would invite more incidences of short-cutting through private parking lots as drivers attempt to circulate between the blocks.

3.1.2 *Grade Separations*

1. The at-grade rail crossing at Kenney Street creates long delays when trains are crossing, which is a concern for emergency response. Also, the at-grade rail crossings at Kenney Street and Frank Street are problems for large trucks. A second vehicle overpass is necessary particularly for emergency response. Frank Street is too far west to be a viable grade-separated rail crossing. The Kalum Lake Road / Braun Street intersection appears to be the preferred location for an overpass over the tracks, as identified in previous reports. An overpass at this location would also promote development on the west side of Terrace, and accommodate the Mill Lands development. Furthermore, a crossing at this location would tie into the Grand Trunk Pathway to achieve an active transportation loop.
2. Pedestrians currently cross the CN rail yard to travel between the Kalum Street neighbourhood residences and the businesses on the highway (especially Walmart). There is extreme danger involved, and there have been a few incidents in the past. This is the most desired location for a pedestrian overpass, but would be cost-prohibitive to build a clear span across multiple tracks. A new overpass should include fencing around the CN Yard for safety.

3.1.3 *Kalum and Lanfear Hills*

1. The narrow, windy geometry on these roads is a problem for larger vehicles, including buses, and traffic speeds are a concern. The pedestrian/cycle path could potentially be relocated outside the corridor. Options are outlined in the City's Active Transportation Plan.
2. Lanfear Drive / McConnell Avenue: there are concerns with vehicle queuing on McConnell Avenue especially around school drop-off and pick-up times. The hill is posted at 40 km/h, but traffic speeds can be as high as 70 km/h.
3. There are pedestrian safety concerns at the bottom of Lanfear Drive at the trail head due to the curve in the road, limited sight distance, traffic speeds, and limited lighting at night.
4. Kalum Street / Munthe Avenue: the limited sight distance is addressed with a mirror, which appears to be working well. Collision statistics should be checked.

3.1.4 *Keith Avenue at Kenney Street*

This is a large intersection with heavy truck movements, potential sight distance issues due to the adjacent hydro pole, and growing levels of delay at the stop conditions on Keith Avenue. The size of the intersection also means that heavy vehicles require bigger gaps in traffic on Kenney Street in order to enter the intersection. There is a problem with drivers on Keith Avenue failing to observe the stop condition because they either mistake the intersection as a four-way stop, or they do not notice the stop sign (especially with this being the only stop condition on the corridor). A four way stop could be considered, but must not cause queuing across the rail tracks to the north.

3.1.5 *MoTI Issues*

1. Highway 16 (Sande Street)/Keith Avenue: the recent signal upgrade has created a more logical and effective traffic control. There was some initial confusion concerning the right-of-way of the eastbound movement, which has since been addressed by the Ministry.
2. Highway 16 / Kerr Street (Big Bertha): The turning movements for trucks entering the highway from the bulk fuel plant are challenging, and have restricted sight lines. A new egress route that makes use of the existing traffic signal at Walmart would be preferred, but must consider the existing traffic pattern in the plant (which has been configured to accommodate loading only in the eastbound direction). There is a road right-of-way designated opposite the Walmart access, however there is no construction timeline.
3. Highway 16/Eby Street: the speed at which some drivers negotiate the southbound right turn onto the highway makes it difficult for ambulances to safely enter the highway in an emergency. Emergency vehicle siren detection for signal activation should be considered.

3.1.6 *Active Transportation Issues*

1. Cycling in Terrace would likely increase with more facilities and improved network connections (e.g. Lanfear and Skeenaview Drive).
2. In general the trail networks between the top and bottom of the Horseshoe are good. However, the grades and surfaces are not accessible for strollers and wheelchairs. The stairs on the Howe Creek trail are an issue for the mobility-challenged users.
3. The Grand Trunk Pathway trail should be extended if possible, especially to create a loop around the City connecting trails along the north and south sides of the tracks.
4. The City should consider a designated bike route on the Lakelse Avenue bridge crossing the Skeena River, rather than cyclists using the Highway 16 bridge.
5. Pedestrian crossings on Lakelse Avenue at the Skeena Mall could be improved with sidewalk extensions and pedestrian-activated flashers. The existing flashers are continuous, and are more likely to be ignored by drivers.
6. The existing overpass on Sande Street should be improved for pedestrians and cyclists. There is poor connectivity for pedestrians at the south end of the bridge. Any new grade separations must accommodate pedestrians and bikes.
7. If possible, bike lanes should be further offset from the traffic lanes. In locations where the pavement edge is higher than the gutter pan, there is a hazard for cyclists.
8. A new crosswalk should be considered at Walsh Avenue and Eby Street.
9. A pedestrian crossing should be reviewed on Kenney Street for school children.

3.2 PUBLIC OPEN HOUSE

A public open house for the Transportation Master Plan was hosted at City Hall between 6:00 and 9:00 pm, on Wednesday, February 10th, 2016. There were 12 attendees during the evening. Their input is summarized below.

Discussion Notes:

1. A new truck layover would be beneficial on the highway.
2. Land should be protected for a future overpass at Braun Street.
3. Ambulance drivers often do not know where dead-ends are until they arrive at them.
4. Car navigation systems direct drivers wanting to access the top of the Horseshoe to Eby Street, which does not connect up the hill.
5. McElhanney Consulting Services will contribute the designs for two staircases adjacent to Lanfear Drive and at Eby Street.
6. If a pedestrian bridge is built at Kalum Street to cross the railway tracks in favour of any other vehicle crossing, then it should also accommodate ambulances.
7. The steep gradient on the westbound approach of Park Avenue to Kalum Street is problematic in icy conditions.
8. The Lanfear Drive/Pheasant Street intersection is a concern, and requires redesign to reduce traffic speeds entering Pheasant.
9. The trail along the railway corridor has safety concerns, especially when compared to Grand Trunk Pathway.
10. Barrier curb is preferred to roll-over curbs as it makes pedestrians feel safer. Boulevard separation would be ideal.
11. The study will define preferred typical cross sections for the different road classes.

Identified Locations for Consideration:

Using red dots on a map, attendees identified the following areas of concern:

- Keith Avenue at Kenney Street
- Lanfear Hill, top, middle, and bottom
- Sande Street (Highway 16) Overpass
- Lakelse Avenue at Eby Street
- Eby Street at Hamer Avenue
- Lakesle Avenue at Sparks Street
- Sparks Street at Straume, Tuck and McConnell Avenues
- Park Avenue at Emerson Street
- Kalum Street at Park Avenue
- Kalum Street at CN rail yard (pedestrian crossings)

Using green dots, attendees also identified positive issues in the Terrace transportation network, including: the street-scaped block of Lakelse Avenue (Emerson to Kalum Street); the new lane diet on Kalum Street; the Grand Trunk Pathway; the trail network around Skenaview; and the opportunity for a new rail overpass at Braun Street/Kalum Lake Rd.

3.3 PUBLIC SURVEY

An online public survey was developed to invite input from the public into the development of the Transportation Master Plan. The survey asked 14 questions, and was available for the four weeks between February 12th and March 12th, 2016. A copy of the survey is provided in Appendix B.

In total, 319 responses were received (i.e. almost 3% of the population). Over 90% of the respondents were from Terrace, and were evenly distributed between neighbourhoods. Each pin in Figure 9 represents between 1 and 5 survey responses, and is placed at the geographic centroid of the respective postal code area of those responses.

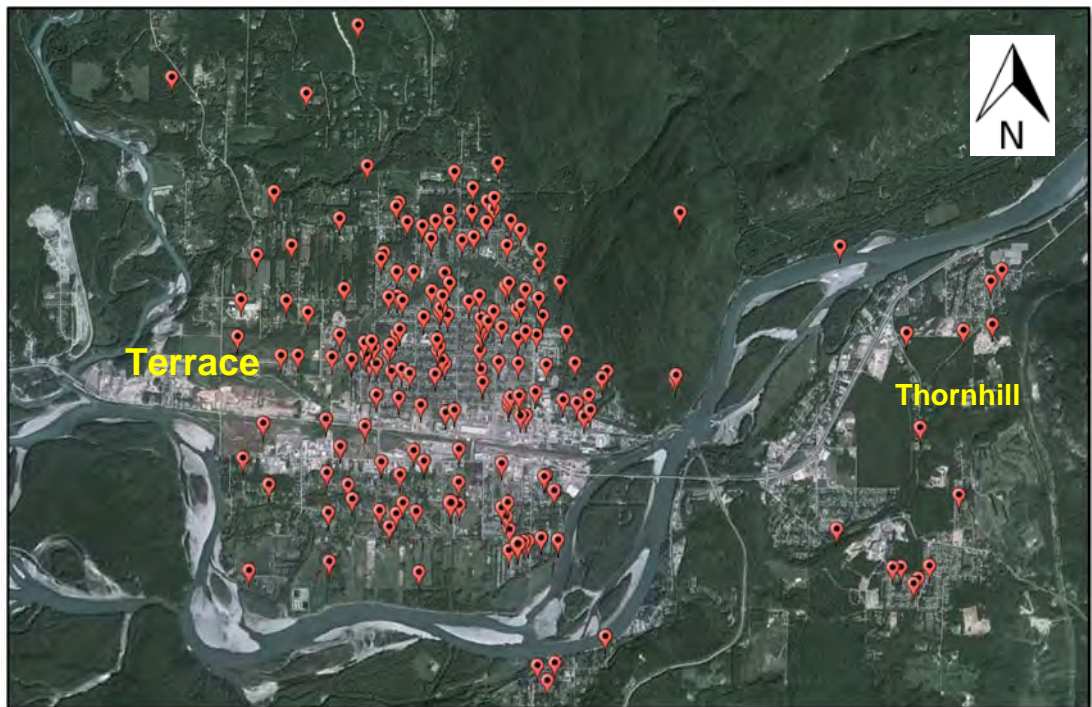


Figure 9: Postal Code Areas of Respondents

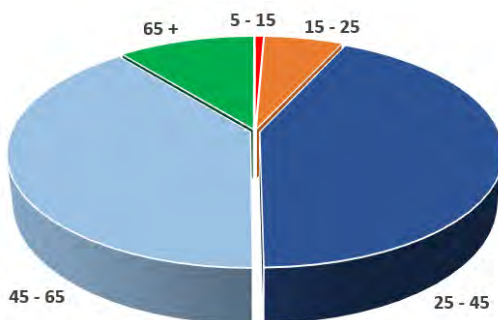


Figure 10: Ages of Respondents

Approximately 6% of respondents were from the Thornhill community to the east, and another 3% were from outside the area (e.g. Kitimat, Colwood, Dawson Creek).

The survey was answered by a diverse mix of age groups, with over 80% between the ages of 25 and 45 (Figure 10).

The responses to the survey are summarized in the following sections.

3.3.1 Impressions of the Transportation System

The survey asked for respondents' impressions of the safety, reliability, convenience and guidance/wayfinding of the existing transportation system. The rankings were between 1 (very poor) and 5 (very good).

The overall safety of the transportation system received a weighted average score of 2.8, which indicated that road safety was a concern for respondents (Figure 11). Road safety and the local collision history is studied in detail in Section 6.

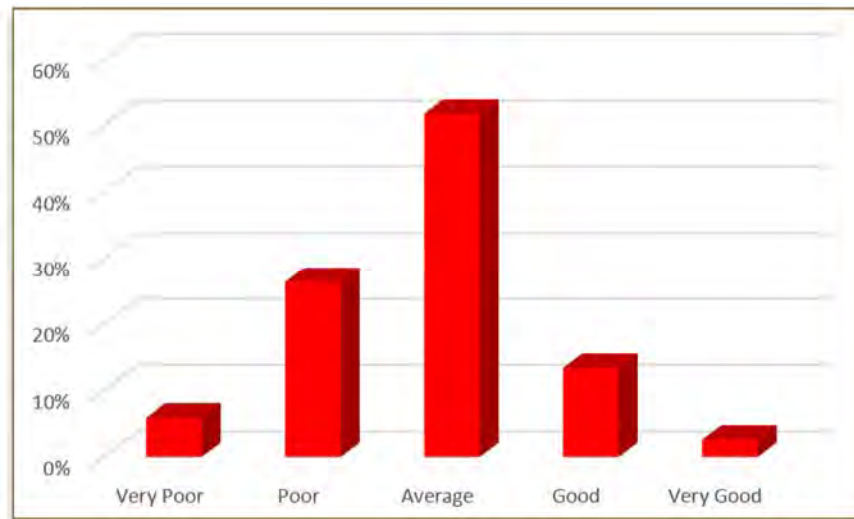


Figure 11: Public Impression of Road Safety

The reliability of the transportation system scored better, with a weighted average of 3.1 (Figure 12). This is likely due to the available capacity on the roads, and the relatively low traffic volumes and delays.

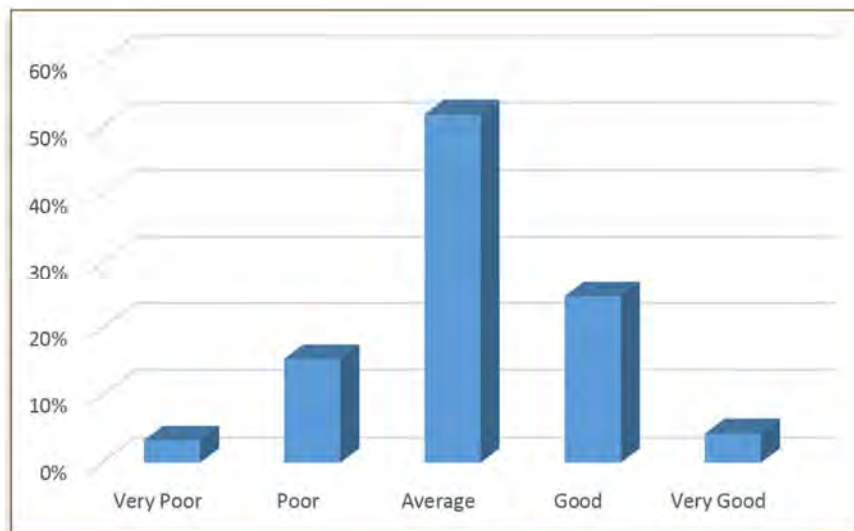


Figure 12: Public Impression of System Reliability

The convenience of the transportation system scored a weighted average of 2.8 (Figure 13). The lower score may be indicative of a concern about the limited opportunities to cross the railway tracks.

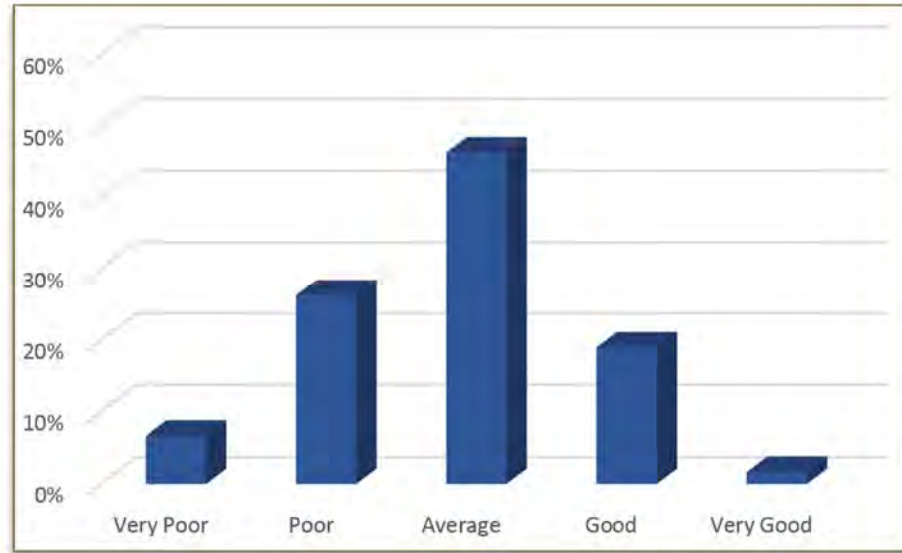


Figure 13: Public Impression on System Convenience

The guidance and wayfinding in Terrace scored a weighted average of 2.9 (Figure 14). This indicates that system users may be having difficulty finding their way around the city.



Figure 14: Public Impression of System Guidance / Wayfinding

3.3.2 *Appreciated Aspects of the Transportation System*

The survey asked respondents to identify what they appreciated most about the Terrace transportation system. The question was answered by 220 respondents; the comments are summarized below. The complete list of responses is provided in Appendix C.

1. Traffic Mobility: The most frequent responses was an appreciation for the ability to move freely through the road system, with specific mention of:
 - Low volumes of traffic, short delays, and few traffic signals (33).
 - Convenience, especially with the grid network and proximity to amenities (20).
 - Recent improvements to the Keith Avenue / Sande Street signal (36).
 - Ease of guidance / wayfinding through the city (12).There were also positive comments about the recent laning improvements on Kalum Street (3), the traffic signage in general (2), and the two available river crossings (2).
2. Walking and Cycling: The second most frequent responses concerned the pedestrian and cycle systems in Terrace. Specific mention was made of:
 - The walkability of Terrace due to available pedestrian infrastructure and the compact layout of the city (15). Recent improvements were appreciated (3).
 - The ability to cycle around the city (10), with appreciation for the recent bike route improvements (4)
 - The availability and quality of the local trail system, including the Grand Trunk (“Millenium”) Trail (11) and the Howe Creek Trail (2).
3. Transit System: Many respondents expressed appreciation for the local transit system, with comments about its convenience (10), availability (4), and affordability (4).
4. Road Maintenance: A number of respondents liked how well the roads were maintained, especially the continual rehabilitation (7), and snow removal (4).
5. Parking: Three respondents mentioned the ease and convenience of parking as an important local benefit.
6. Traffic Safety: Two respondents identified their appreciation for the safety of the road system.

3.3.3 Concerns with the Transportation System

The survey asked respondents to list their main concerns with the existing transportation system. The question was answered by 273 respondents. The results included comments about the system in general, and specific locations of concern, as summarized below. The complete list of responses is included in Appendix C.

General Concerns:

1. Transit System: The most frequent concern was the desire for improved transit service (i.e. greater coverage, longer service hours, Sunday service, more bus stops, and more service to Thornhill) (36). There were also concerns expressed about the need for better information on the routes and schedules (4), bus driver education (3), and accessibility (1). Six respondents asked if a larger number of smaller buses may better suit Terrace.
2. Pedestrian Network: There was a large response in favour of making Terrace more walkable (35), i.e. with the construction of more sidewalks, especially in the north and south areas of the city. Nineteen respondents identified pedestrian safety as a concern, with many citing the need for more illumination of sidewalks and crosswalks. Snow clearing on sidewalks (5), and accessibility of the pedestrian network (2) were also concerns.
3. Cycle Network: Another frequent concern was the desire to improve the cycle network (27), with bike lanes and trails. The safety of the existing cycle network was identified as a concern (8). Respondents also mentioned their desire for more bike racks for secure bicycle parking (3), and the need to sweep the bike lanes (3).
4. Road Condition: There were twenty (20) respondents who identified concerns with the condition of the pavement in Terrace. Specific locations included Eby Street by City Hall (4), Greig Avenue (3), and Loen Avenue (1). The visibility of painted lane lines was also a concern (5). Two respondents mentioned the need for more dust suppression on gravel roads.
5. Intersection Traffic Control: Ten respondents mentioned that they found some intersection traffic control to be confusing. Three wanted more roundabouts, and one wanted more traffic signals. The sight lines at intersections was also identified as a concern (3).
6. Heavy Truck Traffic: The presence of large trucks in Terrace was a significant concern (14), with a clear desire for a designated truck route on Keith Avenue.
7. Parking: Four respondents mentioned a desire for more parking Downtown. There were also two who wanted parking kept out of the bike lanes, and three who expressed concern about the obstruction of sight lines caused by parking.
8. Driver Education: Many respondents were concerned about other drivers in Terrace. This included their lack of understanding of traffic control (8), speeding, especially in school zones (7), and awareness of cyclists and pedestrians (4).

Location-Specific Concerns:

- Need for better connectivity between the north and south areas of the city (6), including another grade-separated rail crossing (e.g. at Kalum Lake Road) (31), and a pedestrian overpass (e.g. at Kalum Street) (7).
- Keith Avenue and Kenney Street traffic control (27)
- Lakelse Avenue lane design, safety, and traffic speeds (16)
- Lanfear Hill: need for trail (11); safety (5); traffic speeds (5); crossing at bottom (2)
- Skeenaview Drive: need for trail (11); safety (2); lighting (1); traffic speeds (1)
- Confusing traffic control at intersection of Eby Street / Lakelse Avenue (13)
- Four-way stop at Highway 16 / Highway 37 (13)
- Lakelse Avenue / Sparks Street offset T intersection (7)
- Kalum Street: traffic congestion and pedestrian crossing safety at Lazelle Ave (5); transition to three lanes at south end (3); illumination at bottom of hill (3); red light running at Park Avenue (2).
- Recent Sande Street / Keith Avenue signal improvements, and the desire for an advance eastbound left turn phase (6)
- Sande Street overpass pedestrian and cycle safety (5)
- Pedestrianization of Downtown (3), incl. traffic calming (1) and streetscaping (1)
- Skeena River Bridge bicycle accommodation (4)
- Keith Avenue flooding issues (3)
- Pedestrian safety and parking congestion on Haugland Ave at Cassie Hall School (3)
- Improved access to the “Bench” (3)
- Thomas Street / McConnell Avenue congestion and sight distance (2)
- More access to the Grand Trunk Trail across Highway 16 (2)
- Traffic speeding around Halliwell Avenue and Sparks Street (2)
- New sidewalk requests on Eby Street North (2); Park Avenue, east of Eby Street (1); and Keith Avenue, east of Kenney Street (1).
- Expand north road network (1), including extending Thomas to Johnson (1)
- Inadequate hospital access to the Sande Street overpass (1)
- Eby Street / Lazelle Avenue pedestrian crossing safety (1)
- Skeenaview Drive / Munthe Avenue intersection safety (1)
- Erosion and degradation on Howe Creek Trail (1)
- New pedestrian signal request at Highway 16 / Clark Street (1)
- Insufficient sight lines at Highway 16 / Munroe Street (1)
- Traffic signal operation at one-lane bridge (1)
- Park Avenue extension between Eby Street and Munroe Street: connect (1); do not connect (1).

3.3.4 Transportation Priorities

The survey asked respondents to rank their top priorities for the transportation system. Applying a weighting to the answers, the following results were received (Figure 15).

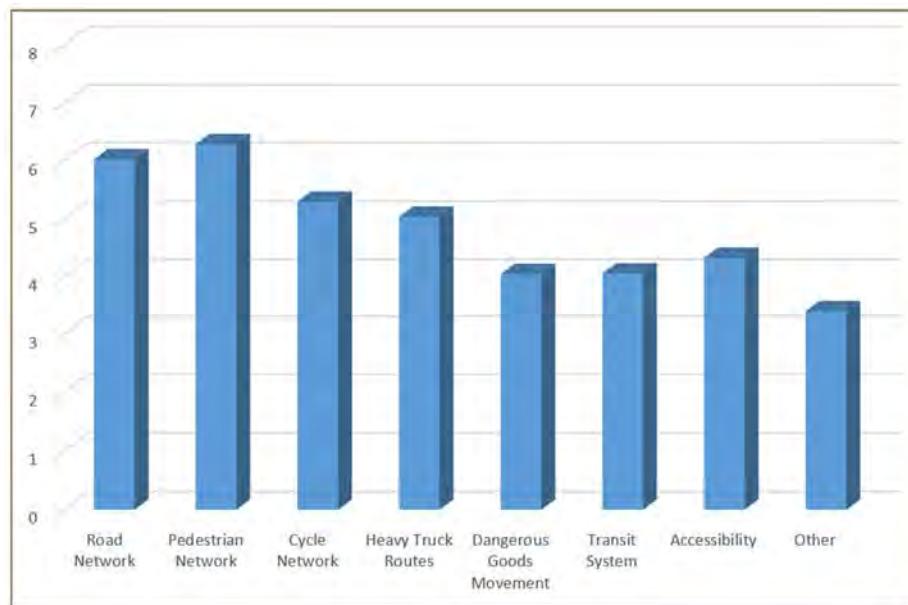


Figure 15: Respondents' Transportation Priorities

The highest priority was the pedestrian network, indicating a desire to improve the walkability of the city. The next highest priorities were the road network, the cycle network, and managing heavy truck traffic. The respondents who identified “Other” priorities listed the following:

- Another rail overpass for vehicles (8)
- Better access to the “Bench” (6)
- Pedestrian/cycle overpass, esp. near Kalum Street (6)
- Improved pedestrian network (5)
- Heavy truck traffic (4)
- Improve cycle network (3)
- Traffic speeds (3)
- Improved enforcement (3)
- Street lighting (3)
- Road condition (2), as well as road markings (2) and road drainage (1)
- Keith Avenue / Kenney Street intersection (2)
- Four way stop at Highway 16 / Highway 37 (2)
- Development of alternate routes into and out of the city (2)
- Transit service (incl. new service to airport) (2)
- Audible traffic signals for visually impaired (1)
- Eby Street / Lakelse Avenue intersection (1)
- Streetscaping Downtown (1)
- On-street parking regulation (1)
- Winter road maintenance (1)

3.3.5 New Rail Overpass at Kalum Lake Road

The respondents identified their priority for a new vehicle overpass over the CN rail line, currently proposed at the Kalum Lake Road intersection on Highway 16 (Figure 16).

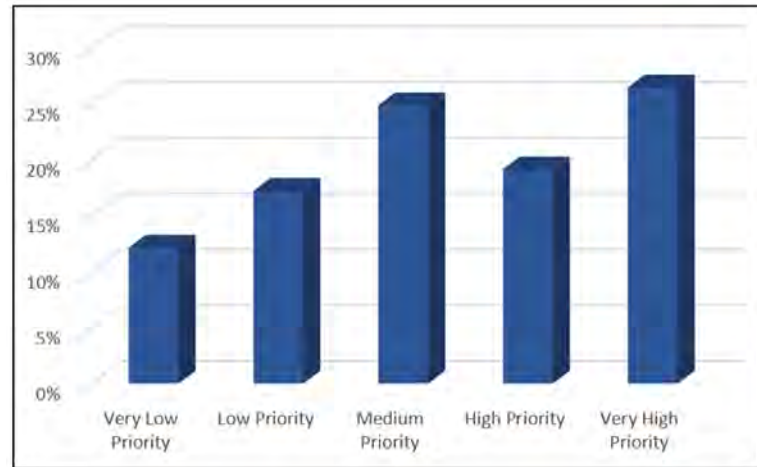


Figure 16: Respondents' Priority of a New Vehicle Overpass

Over 45% of respondents ranked this improvement as a “High” or “Very High” priority, with another 25% ranking this as a “Medium” priority. The weighted average score was 3.3/5.0.

3.3.6 New Pedestrian / Cycle Overpass

The respondents identified their priority for a new pedestrian / cycle overpass over the CN rail line to connect the north and south neighbourhoods of the city (Figure 17).

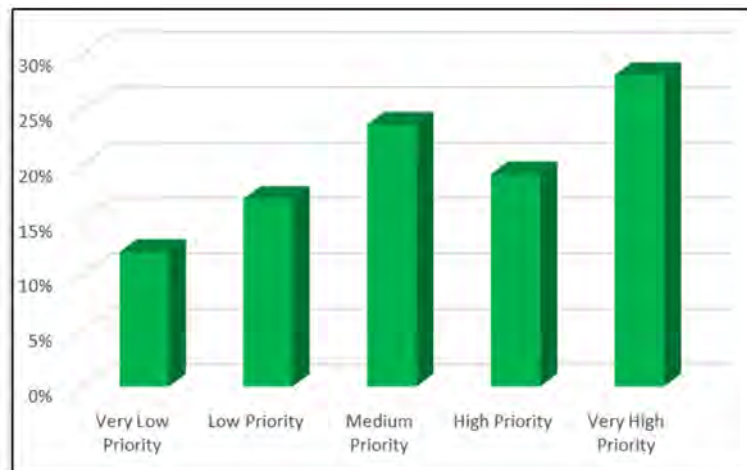


Figure 17: Respondents' Priority of a New Pedestrian / Cycle Overpass

Over 47% of respondents ranked this improvement as a “High” or “Very High” priority, with another 24% ranking this as a “Medium” priority. The weighted average score was 3.3/5.0.

3.3.7 Bench Access via Lanfeear Drive and Skeenaview Drive

The respondents identified their priorities for improving access to the “Bench” via both Lanfeear Drive and Skeenaview Drive (Figure 18).

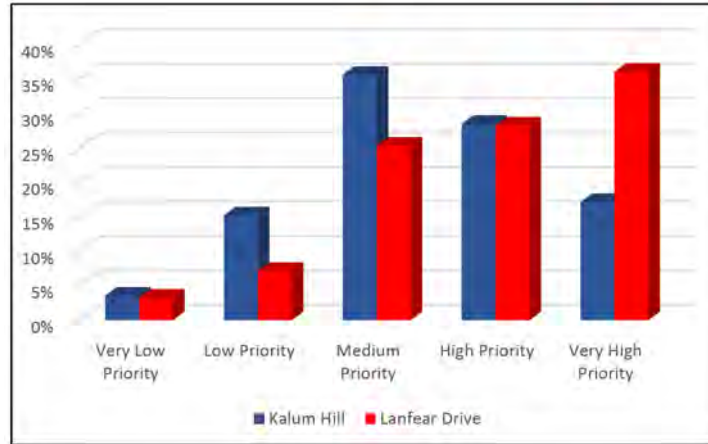


Figure 18: Bench Access Priorities

The respondents strongly favoured improvements to Lanfeear Drive, with 64% identifying this as a “High” or “Very High” priority, and a weighted average score of 3.9/5.0. The scores for Skeenaview Drive were 46% and 3.4/5.0 respectively.

3.3.8 Downtown Street Lining Changes

The respondents were asked to identify their priority for revisiting the existing lining on Lakelse Avenue, through Downtown Terrace, in an effort to improve the pedestrian and cyclist environment, and reduce traffic speeds and conflicts (Figure 19).

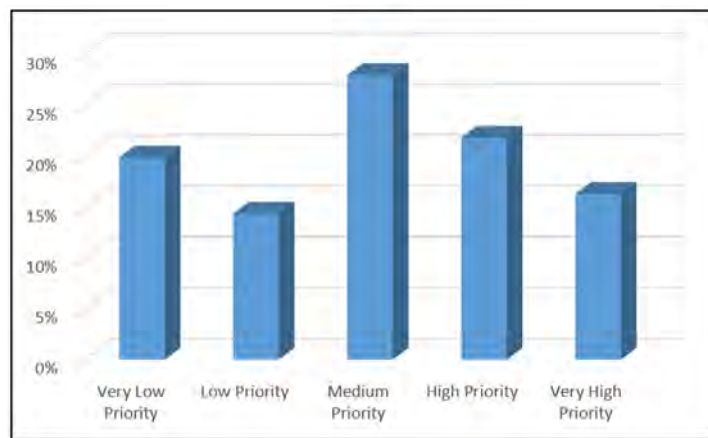


Figure 19: Downtown Street Lining Priorities

Approximately 38% of respondents ranked this improvement as a “High” or “Very High” priority, with another 28% ranking this as a “Medium” priority. The weighted average score was 3.0/5.0.

3.3.9 Intersection Upgrades

Three intersections with traffic control and/or geometric issues were presented to the respondents to identify their priorities for improvements (Figure 20):

1. Eby Street / Lakelse Avenue has atypical traffic flow, with right-of-way given to westbound traffic on Lakelse Avenue (i.e. the stem of the “T” intersection).
2. Lakelse Avenue / Sparks Street is a signalized offset “T” intersection in Downtown Terrace, which incurs long delays due to the split signal phasing.
3. Thomas Street / McConnell Avenue / Cooper Drive is an offset “T” intersection at the top of Lanfear Drive Hill, and has a heavy commuter pattern and sight distance concerns.

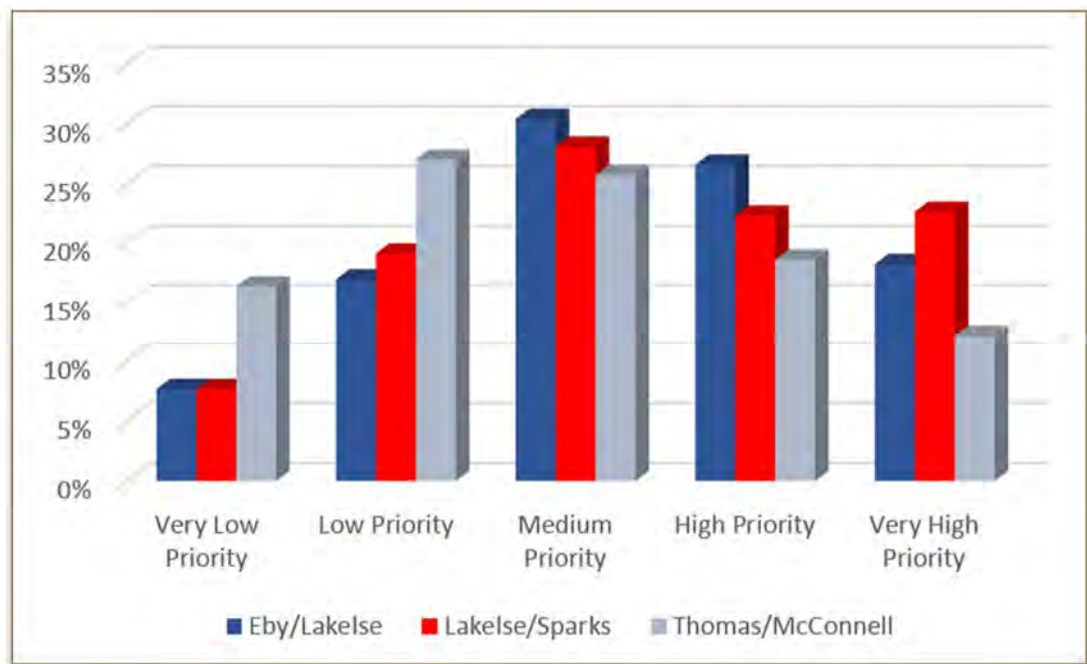


Figure 20: Intersection Upgrade Priorities at Three Intersections

The highest intersection priority was Lakelse Avenue / Sparks Street, with 45.0% of respondents identifying this as either a “High” or a “Very High” priority, and a weighted average score of 3.3. The second priority was Eby Street / Lakelse Street, with 44.9% and 3.3 respectively. The Thomas Street / McConnell Avenue intersection ranked third, with 30.9% and 2.8 respectively.

3.3.10 Other Issues and Comments

Respondents were invited to identify other issues or comments they may have with the Terrace Transportation System. Most comments reinforced the issues outlined above. The following responses were received, in descending order of frequency. The complete list of comments is provided in Appendix C.

1. More bike lanes (28) and trails (2), including on local bridges (e.g. Sande Overpass (4), Ferry Island (3)). Also more secure bike racks (3).
2. More sidewalks (25), esp. in the north and south areas of the city. Also more crosswalks (3), with lighting (5) (esp. Lakesle), and accessibility (1). Clear snow on sidewalks (5).
3. Upgrade the traffic control at Keith Avenue / Kenney Street (22).
4. Reduce traffic speeds (15), esp. with traffic calming (7) and enforcement (4).
5. Lakelse Avenue lane widths are a problem (15). Tim Horton's drive thru causes queuing problems on-street (2). Lane diets are not desirable for some people (5).
6. New pedestrian overpass over rail line (14), esp. around Kalum Street.
7. More pavement rehabilitation and pothole repair (14), esp. Munro (1), Greig (1), Davis (1) and Loen (1).
8. New vehicle overpass over rail line (12), although Kalum Lake Rd may not be right location (6)
9. Upgrade the four-way stop at Highway 16 / Highway 37 (11).
10. Lane lines are not visible; paint doesn't last (11)
11. Safety concerns on Lanfeer Drive (9), esp. pedestrian crossing at bottom of hill. Consider closing access to Pheasant Street (1).
12. Need to develop Terrace for the future (7), including better access to Bench. Develop the network (2), connect Davis (1), and densify the town (1).
13. Sande Street / Keith Avenue signal upgrade appreciated (5), but reprogramming (e.g. with eastbound advance left turn phase) is requested to help manage conflicts (6).
14. More transit service (6), esp. a route to the airport (3). More stops (1) and shelters (1).
15. More parking (6), esp. Downtown. Consider angle parking (2).
16. Reroute heavy truck traffic out of town (e.g. to Keith Avenue) (5).
17. More street lighting (5).
18. Improve sidewalks and lighting on Eby Street North (3).
19. Kalum Street lane diet was supported (4); unsupported (3).
20. Need driver education (5), as well as for cyclists (1) and pedestrians (1).
21. Pedestrian crossing concerns at Kalum/Lazelle (5); Kalum/Loen (1); and top of Skeenaview Drive (1).
22. Improve snow removal on streets (5), and sweep winter sand/gravel (2).
23. Concern with Munthe Avenue intersection on Skeenaview Drive (3).
24. Other intersection concerns are at Eby/Lakelse (2); Park/Kalum (2); Halliwell/Sparks (2); left turn restrictions at Hwy 16/Tetrault (2); Halliwell/Keith signal (1); Hwy 16/Feeney signal timing (1); advance EB left turn desired at Hwy 16/Eby (1).
25. Traffic noise should be managed/abated (2).
26. Keep traffic signs visible and unobstructed (2).
27. Need longer walk times at signalized crosswalks (2).
28. Pave gravel roads (2).
29. Install roundabouts (2).
30. On-street parking blocks sight lines at Lazelle/Park/Sparks (2).
31. Upgrade link to town on one-way bridge (1) including revamping bridge signal (1).

4 TRANSPORTATION DEMAND FORECASTING

4.1 EXISTING TRAFFIC PATTERNS

Traffic counts at 27 key intersections were collected to analyze the traffic patterns in Terrace. These included 11 highway intersections (taken from the recent Highway 16 Corridor Study, Ref. 20), and 16 city intersections (mostly counted in March 2016 on regular school days).

The traffic patterns on Highway 16 at the four MoTI short count stations are shown in Figure 21. There was no clearly defined AM Peak Hour, as the traffic volumes continue to grow during the morning hours. The PM Peak Hour is typically around 4:00 to 5:00 PM. The directional split is close to 50 / 50 (eastbound versus westbound) at each station. However, at the station west of Highway 37, the commuter pattern of Thornhill residents working in Terrace appears to be reflected by a slightly higher westbound volume in the morning, and slightly higher eastbound volume in the afternoon.

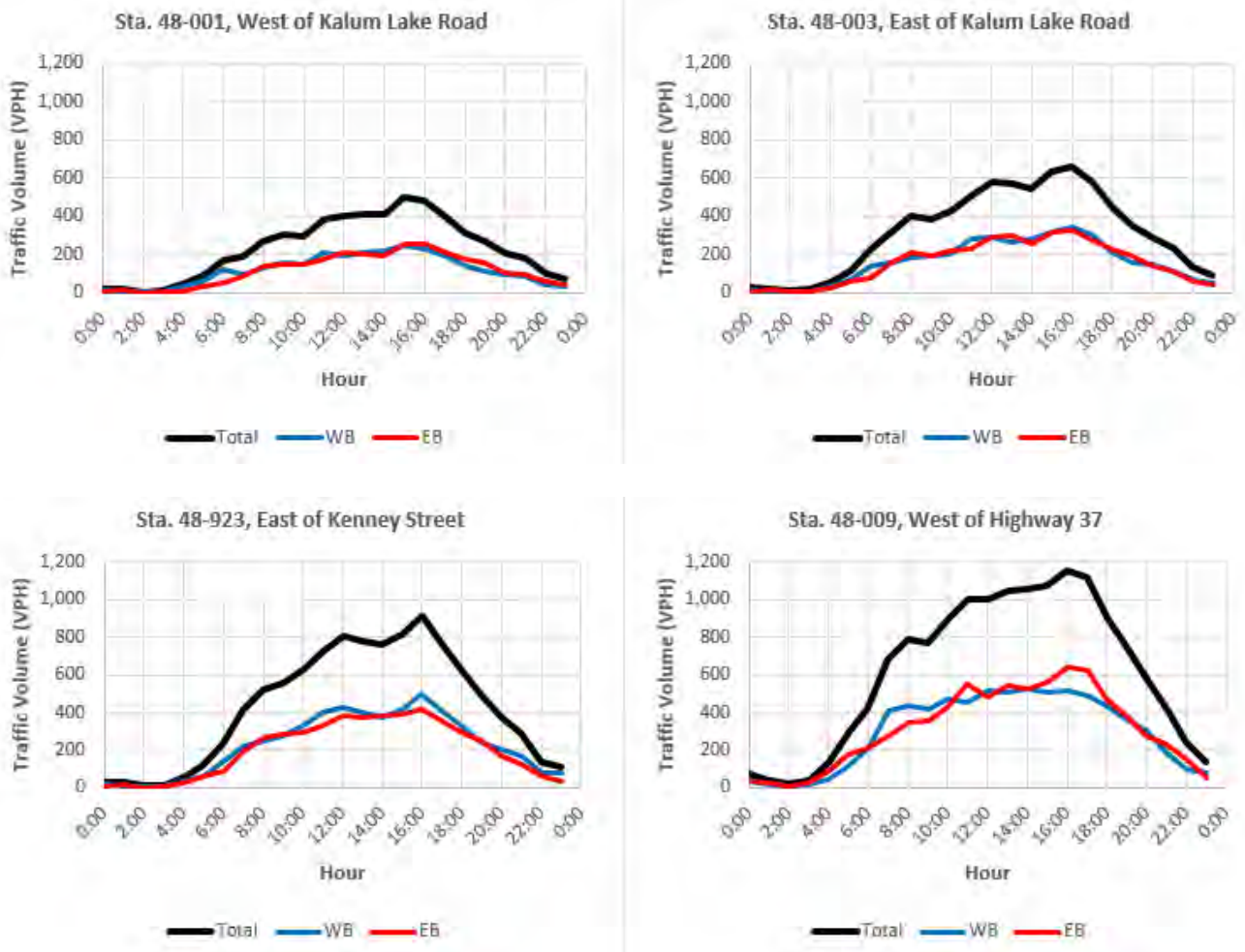


Figure 21: Hourly Traffic Volumes on Highway 16 through Terrace
(Source: MoTI short count stations, July 2014)

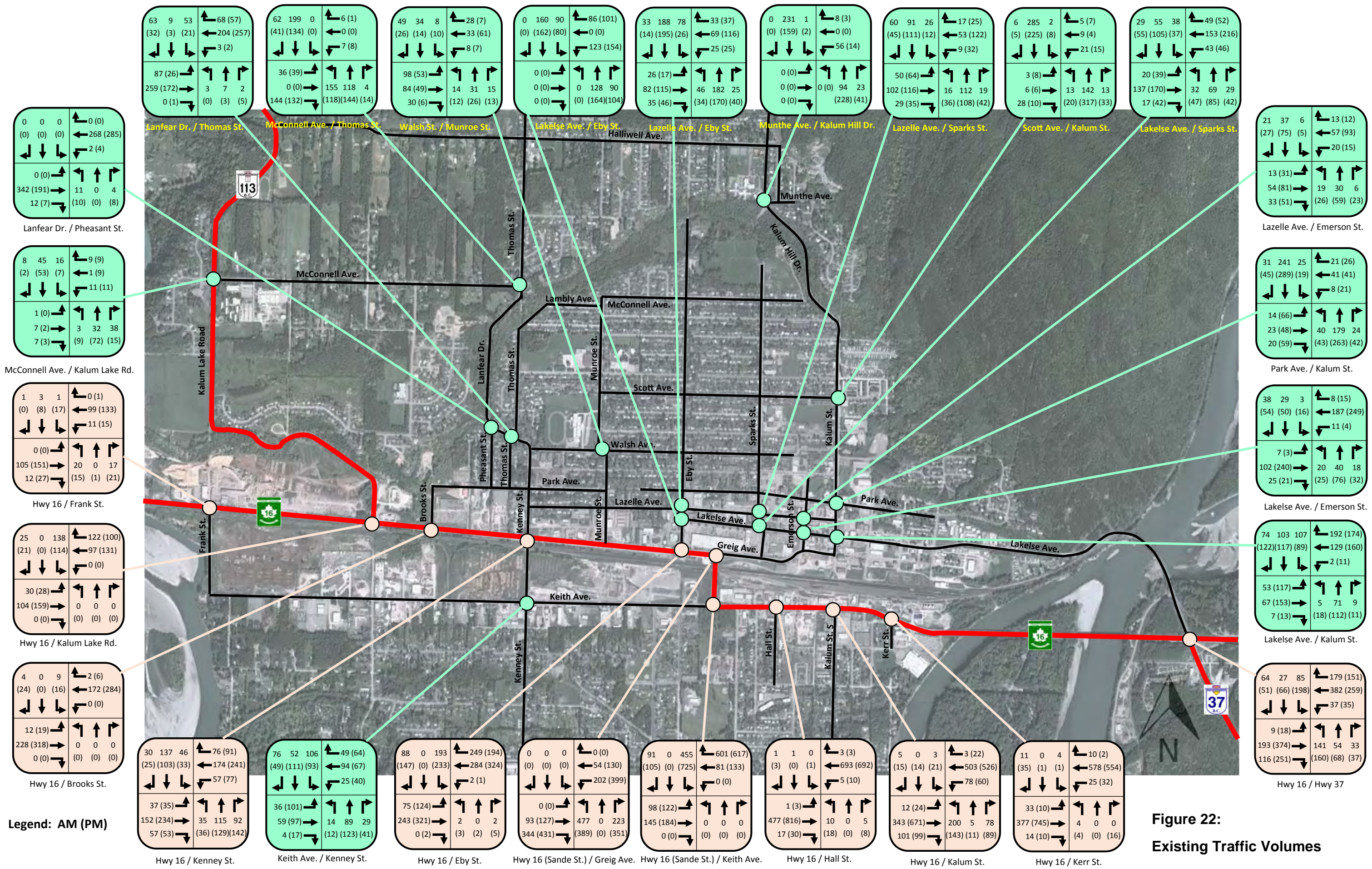
The 16 city intersections where new traffic counts were completed are listed in Table 4. Based on the data, the Peak Hours in the Downtown were typically around 8:15 and 9:15 AM in the morning, and 4:15 to 5:15 PM in the afternoon. Outside the Downtown area, the peak hours were typically earlier, especially in the vicinity of schools.

Table 4: Traffic Counts at City Intersections

	East - West Road	North - South Road	Count	AM Peak		PM Peak	
				FROM	TO	FROM	TO
1	Munthe Ave	Kalum Drive	Mar-16	7:45	8:45	16:15	17:15
2	Lakelse Avenue	Eby Street	Mar-16	8:15	9:15	15:45	16:45
3	Lakelse Avenue	Emerson Street	Mar-16	8:15	9:15	16:15	17:15
4	Lakelse Avenue	Kalum Street	Mar-16	8:15	9:15	15:45	16:45
5	Lakelse Avenue	Sparks Street	Mar-16	8:30	9:30	16:15	17:15
6	Lanfear Drive	Pheasant Street	Mar-16	8:15	9:15	16:15	17:15
7	Lanfear Drive	Thomas Street	Mar-16	8:00	9:00	16:30	17:30
8	Lazelle Avenue	Emerson Street	Mar-16	8:30	9:30	16:00	17:00
9	Lazelle Avenue	Sparks Street	Mar-16	8:15	9:15	15:30	16:30
10	McConnell Avenue	Kalum Lake Road	Mar-16	8:00	9:00	16:30	17:30
11	Walsh Avenue	Munroe Street	Mar-16	8:00	9:00	16:15	17:15
12	Scott Avenue	Kalum Street	Mar-16	8:00	9:00	16:30	17:30
13	McConnell Avenue	Thomas Street	Mar-16	8:00	9:00	14:45	15:45
14	Park Avenue	Kalum Street	May-14	8:15	9:15	14:45	15:45
15	Keith Avenue	Kenney Street	Aug-14	7:45	8:45	16:15	17:15
16	Lazelle Avenue	Eby Street	Sep-16	8:15	9:15	15:15	16:15

For the purpose of the network analysis, the Peak Hours at all city and highway intersections were assumed to be concurrent. Also, no seasonal adjustments to the city data were made in consideration of the relatively consistent traffic volumes typical of an urban setting.

The existing traffic volumes at the 27 study intersections are shown in Figure 22.



**Figure 22:
Existing Traffic Volumes**

4.2 EXPECTED GROWTH

As discussed in Section 2.8, a recent economic study for Terrace identified three potential growth scenarios over the next ten years (Ref. 1). The City identified the Medium Growth Scenario as the most likely, and advised that this was planned for use in the update to the Official Community Plan. In the medium scenario, the study estimated the population to grow from 12,494 in 2015 to 19,363 in 2025. This is a 55% increase in population at an annual growth rate of 4.5%. As assumed in the study, this growth would be based on rapid increases in employment and industry, such as ten new manufacturing facilities in the Skeena Industrial Development Park, three mines in the region, and two LNG facilities (i.e. one in Kitimat, and one in Prince Rupert).

By reviewing the available lands for development and their applicable zoning and development potential, the City has provided an estimate of where the residential growth is expected to occur. The city was divided into twelve zones, as shown in Figure 23. The existing and 2025 horizon population in each zone is calculated as shown in Table 5.

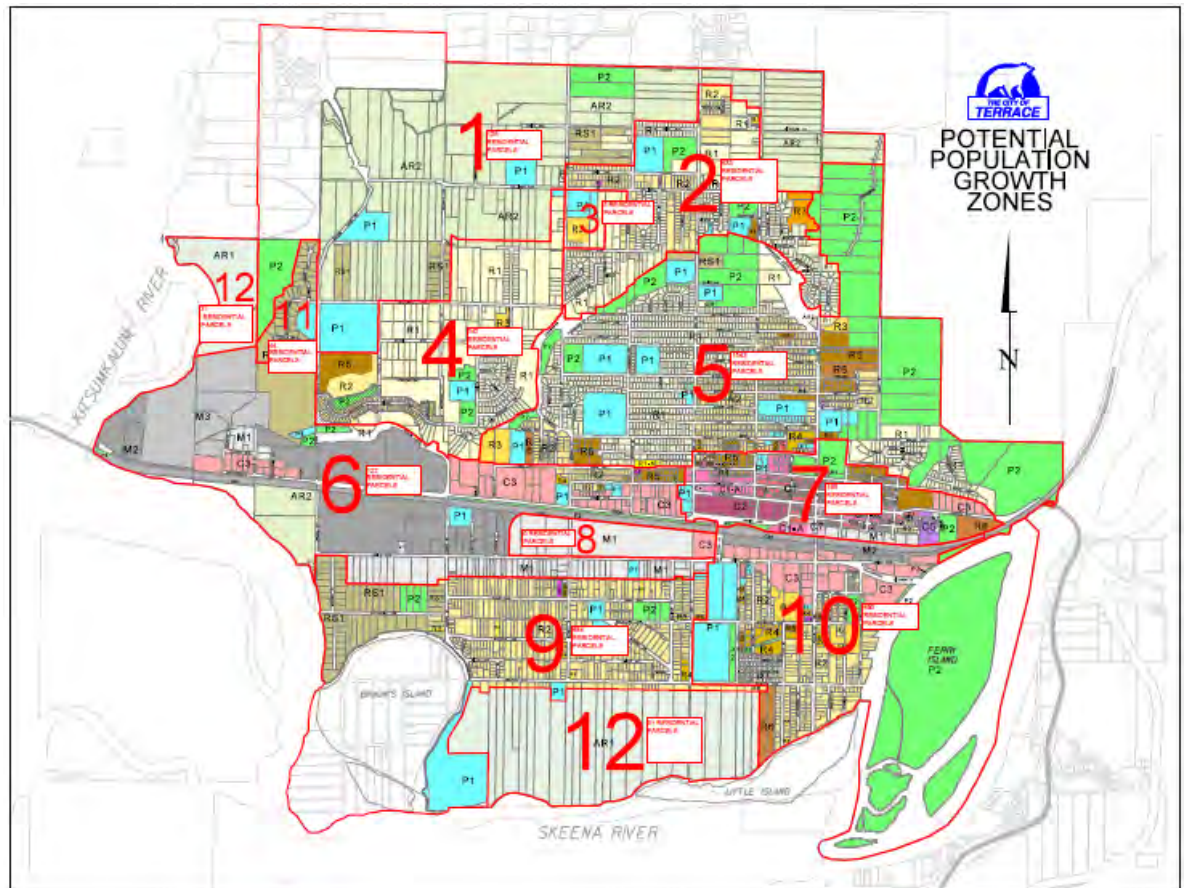


Figure 23: Identified Zones for Development in Terrace
(Source: City of Terrace)

Table 5: 2025 Population Estimates by Zone

Zone	Current Number of Parcels or Units	Current Residential Population* (2015)	Potential New Parcels or Units	Potential New Residents**	Estimated New Residents by 2030	Estimated New Residents by 2025	Estimated New Parcels or Units by 2025**	Estimated Additional Traffic (vpd)
1	120	340	2000	5040	5040	4536	1800	10,800
2	633	1796	112	282	282	253	101	604
3	12	34	97	242	242	218	86	518
4	347	984	354	892	892	803	319	1,911
5	1543	4377	100	252	252	227	90	540
6	122	346	17	42	42	38	15	90
7	198	562	17	42	42	38	15	90
8	0	0	660	1663	496	496	197	1,182
9	684	1941	60	151	151	136	54	324
10	690	1958	60	151	151	136	54	324
11	44	125	0	0	0	0	0	0
12	31	88	0	0	0	0	0	0
Totals	4,424	12,551	3,476	8,757	7,590	6,881	2,730	16,383

(Source: City of Terrace)

* Assuming 2.84 persons per household.

** Assuming 2.52 persons per household.

The City's original population and development estimates were based on a 2030 horizon. To adjust this to the 2025 estimate used in the study, the populations in all zones except Zone 8 (Keith Estates) were reduced by 10%. The Keith Estates development is already assumed to be only 30% developed by 2030, and so was left as originally estimated.

By the above calculations, the estimated 2025 population is approximately 19,400, to match the population predicted in the City's economic study. From these demographic assumptions, the additional daily traffic generated by each zone was estimated assuming 2.5 weekday trips per person (as per data from the ITE Trip Generation Manual, Ref. 9), and the assumed 2.52 persons per household. The result is six daily vehicular trips per household, which was the assumption used in the Infrastructure Upgrade Scoping Study (Ref. 12).

Additional non-vehicular (i.e. walking, cycling and transit) trips may be expected from each zone. This is more likely in multi-family residential development due to the typical lower vehicle ownership, and the proximity to employment and services.

As with any forecasts, these growth assumptions may be realized sooner or later than anticipated. The analysis and subsequent recommendations should therefore be considered as a function of the assumed development intensity, rather than linked to the 2025 horizon year itself. If the growth occurs at a slower pace, the implementation of the identified network improvements can be delayed. If the growth occurs faster than assumed, the improvements will likely need to be implemented earlier, and the technical analysis revisited.

4.3 FUTURE TRAFFIC PATTERNS

Of the 12 identified city zones, the estimated growth is significant only in two areas: the Upper Bench (Zones 1-4) and Keith Estates (Zone 8). Therefore, the traffic from these neighbourhoods was studied in detail.

On the Upper Bench, the estimated Average Daily Traffic for each zone (Table 6) was assigned to the network as follows:

- 20% of traffic was assumed to remain internal to the Upper Bench neighbourhood (i.e. trips to school, university, daycare, etc), or trips north on Kalum Lake Road. The other 80% would travel south toward employment, services and shopping.
- Traffic on Kalum Lake Road would be comprised of trips from 25% of Zone 1 and 50% of Zone 4.
- Traffic on Lanfear Drive would be comprised of trips from 45% of Zone 1, 50% of Zone 2, 100% of Zone 3, and 50% of Zone 4.
- Traffic on Skeenaview Drive would be comprised of trips from 30% of Zone 1 and 50% of Zone 2.
- Combined together, 20% of the the traffic generated by the four zones would use Kalum Lake Road, 40% Lanfear Drive, and 20% Skeenaview Drive.

The estimated additional daily traffic on each route to the Upper Bench was calculated as shown in Table 6.

Table 6: Trip Distribution of Estimated New Traffic

Zone	Estimated New Daily Traffic (vpd)	External Daily Traffic (vpd)	Kalum Lake Road Traffic (vpd)	Lanfear Drive Traffic (vpd)	Skeenaview Drive (vpd)
1	10,800	8,640	2,160	3,888	2,592
2	604	483	0	241	241
3	518	415	0	415	0
4	1,911	1,529	765	765	0
Total	13,833	11,067	2,925	5,309	2,833
Percent of Total	100%	80%	20%	40%	20%

To estimate the PM peak hour traffic, a K Factor (i.e. the proportion of the average daily traffic to the peak hour traffic) of 9.0 was used, which was based on the recent hose counts conducted by the City. A K Factor of 10 was used for the AM Peak Hour, which typically has a slightly lower volume than the PM Peak Hour. Applying ITE directional split data for single family dwellings, 75% of the AM Peak Hour traffic was assumed to be travelling south, and 25% was assumed to be returning north. In the PM Peak Hour, the directional split was assumed to be 37% and 63% respectively. The calculated new traffic volumes on the three roads are as shown in Table 7.

Table 7: Peak Hour Traffic Assignment to and from the Upper Bench (Zones 1-4)

Scenario	Kalum Lake Road	Lanfear Drive	Skeenaview Drive
Average Daily Traffic (vpd) (from Table 6)	2,925	5,309	2,833
AM Peak Hour (vph)	292	531	283
1. Southbound (vph)	219	398	213
2. Northbound (vph)	73	133	71
PM Peak Hour (vph)	325	590	315
3. Southbound (vph)	120	218	116
4. Northbound (vph)	205	372	198

For the traffic in Zone 8 (Keith Estates), 10% of the new trips were assumed to remain in the vicinity. The peak hour traffic volumes were calculated the same as for the Upper Bench. For the directional split, ITE data for multi-family (i.e. townhouse and low rise apartments) was used. In this respect, the AM Peak Hour was assumed to have 20% inbound trips, and 80% outbound trips. In the PM Peak Hour, the directional split would be 67% and 33% respectively. The traffic volumes for Zone 8 are shown in Table 8.

Table 8: Peak Hour Traffic Generated by Keith Estates (Zone 8)

Scenario	Keith Estates
Total Average Daily Traffic (vpd)	1,182
External Average Daily Traffic (vpd)	1,064
AM Peak Hour (vph)	106
5. Inbound (vph)	21
6. Outbound (vph)	85
PM Peak Hour (vph)	118
7. Inbound (vph)	79
8. Outbound (vph)	39

Based on the known major origins and destinations, and the ambient traffic patterns, the assumed distribution of the new traffic from the Upper Bench and the Keith Estates is as shown in Figures 24 and 25 respectively.

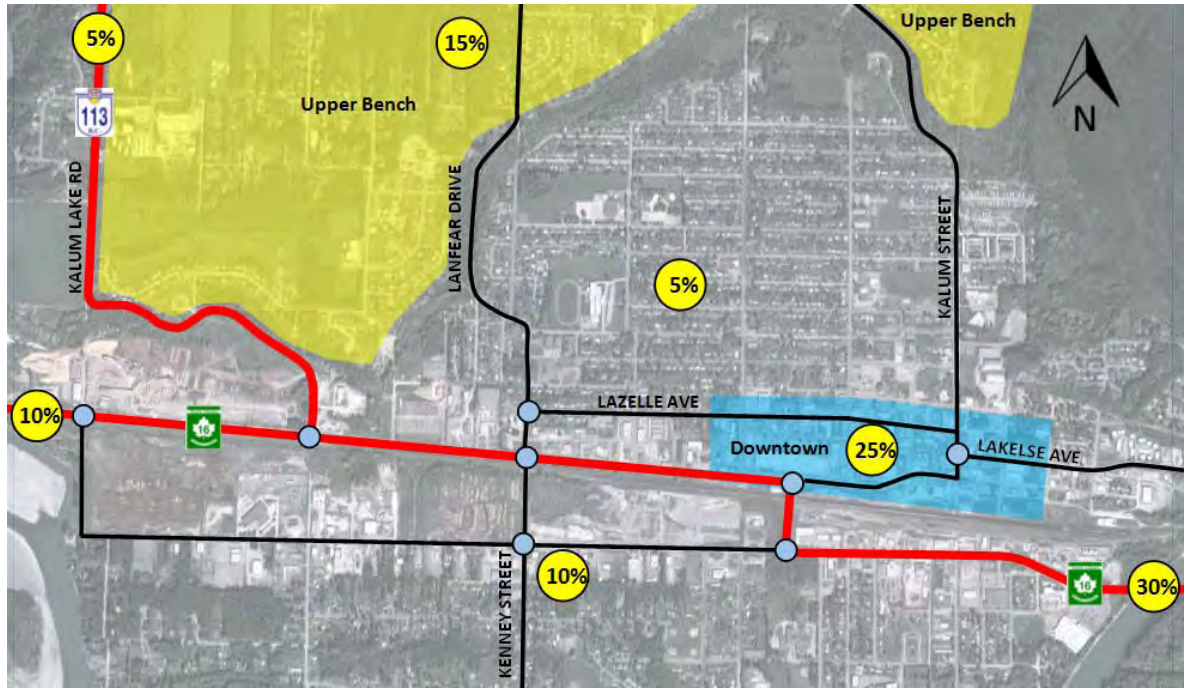


Figure 24: Assumed Trip Distribution of the Upper Bench Traffic

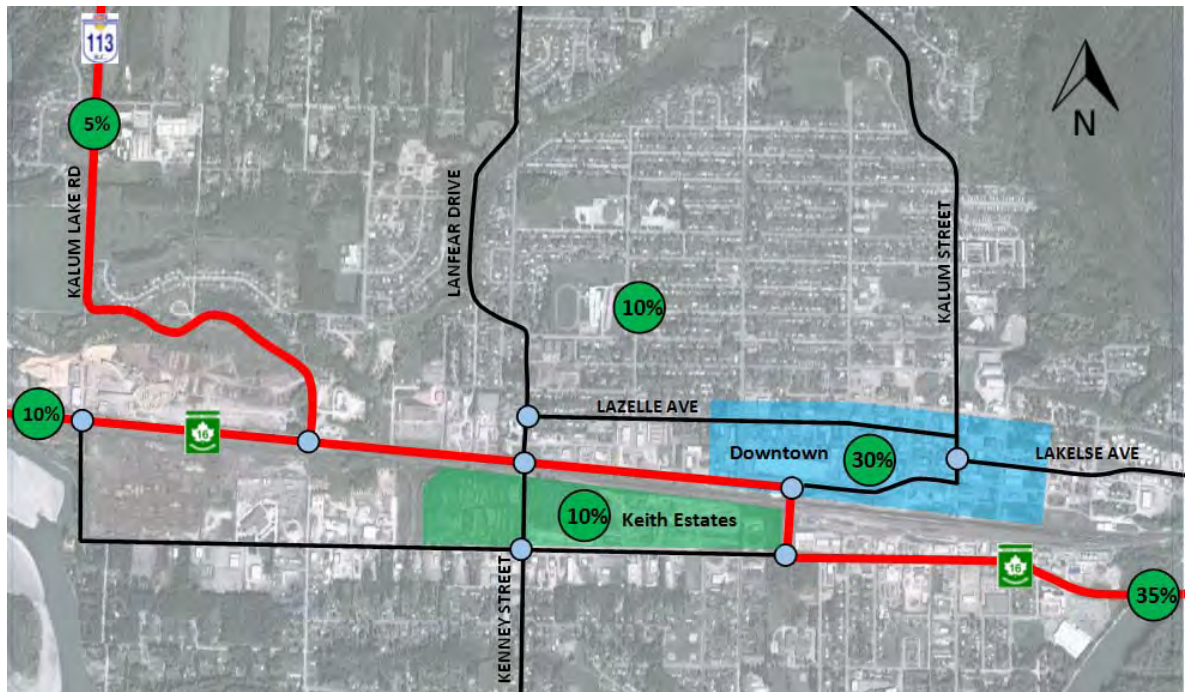


Figure 25: Assumed Trip Distribution of the Keith Estates Traffic

To account for other growth in the city traffic volumes (i.e. not associated with the zones in the Upper Bench or Keith Estates), the following assumptions were made:

1. All traffic movements internal to the Downtown were increased by 40%, which is less than the total anticipated growth in the community, but recognizes Downtown as a key activity centre.
2. All traffic movements outside the Downtown, and not associated with the Upper Bench or Keith Estates, were increased by 10%, which is the combined estimated growth of the remaining zones.
3. The through traffic on the highway was increased by 20%, which follows a 2% annual linear growth rate. This growth rate was confirmed by data from the MoTI short count station 48-009 on Highway 16, just west of the Highway 37 junction (Figure 26). This station has the advantage of count data dating back to 2005, and is sufficiently outside the city core to be a reasonable gauge of highway through traffic.

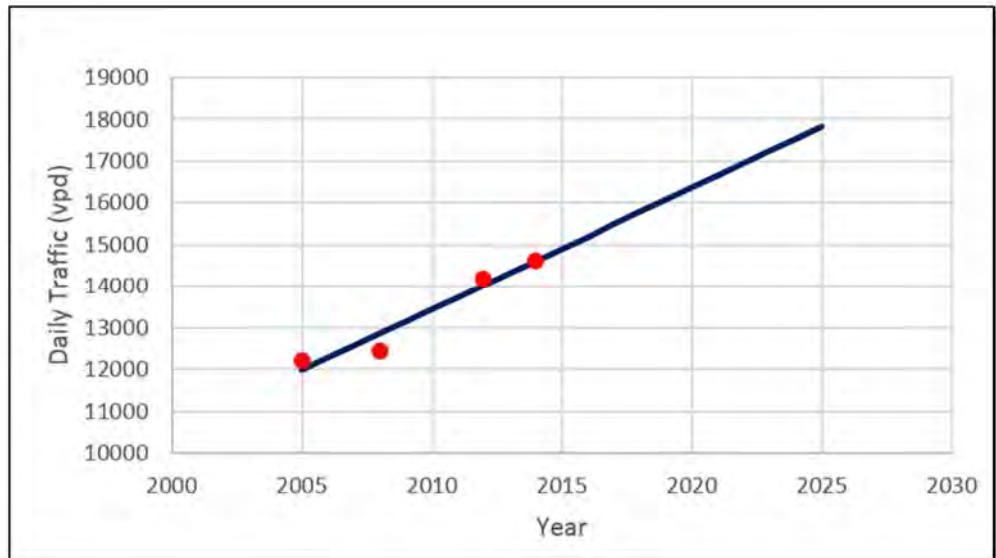


Figure 26: Highway 16 Projected Traffic Growth
(source: MoTI count station 48-009)

Applying the growth assumptions as outlined above, the estimated 2025 peak hour traffic volumes were calculated as shown in Figure 27.

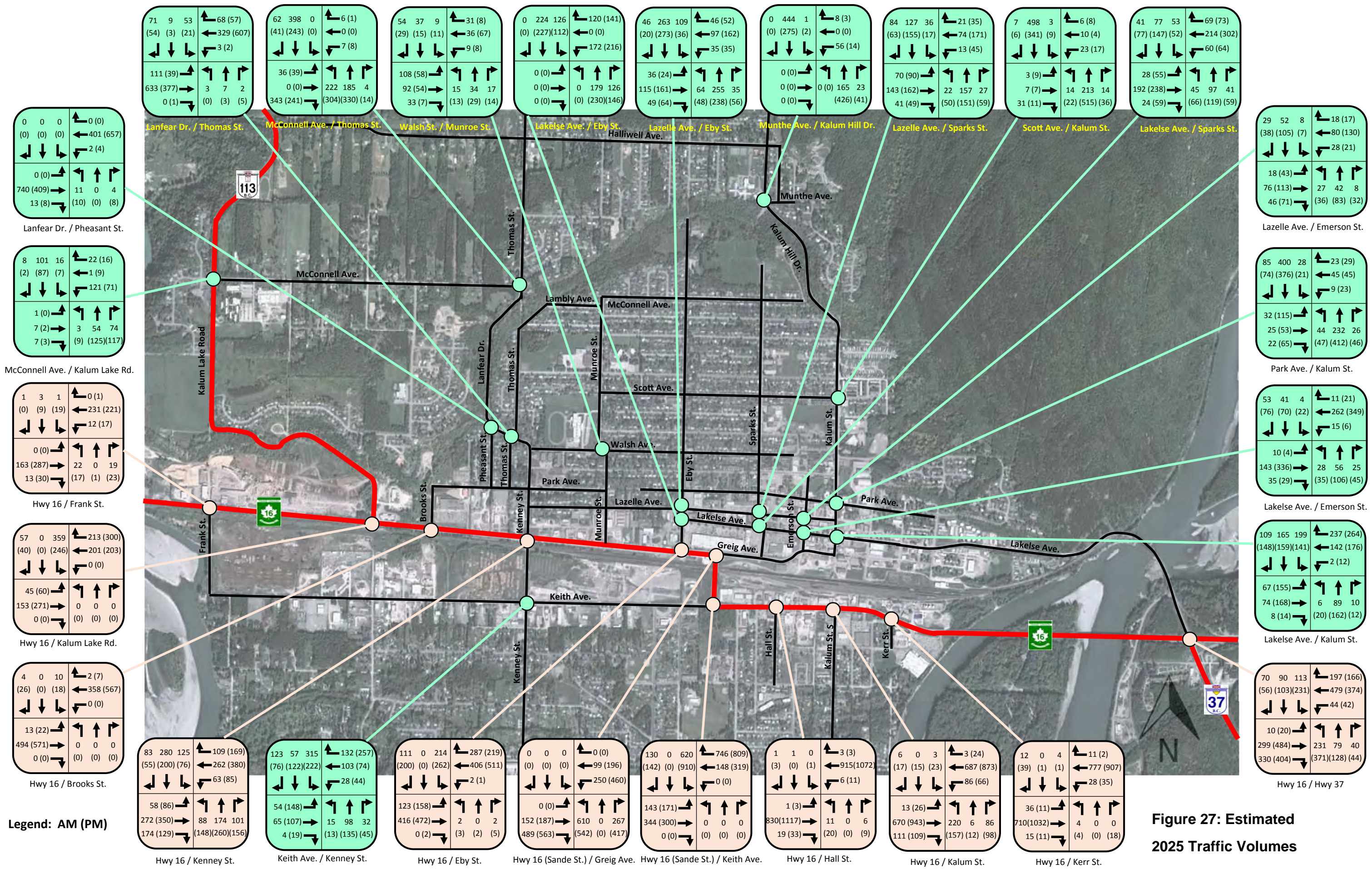


Figure 27: Estimated 2025 Traffic Volumes

5 ROAD NETWORK ANALYSIS

5.1 ROAD FUNCTIONAL CLASSIFICATION

To form the basis for the network analysis and the development of standard cross sections, the existing and future roads in Terrace were functionally classified in accordance with the definitions from the Transportation Association of Canada (TAC). These are:

Arterial Roads: intended primarily to move large volumes of traffic safely and efficiently over relatively long distances. Arterials typically have higher traffic speeds, with little or no direct access to adjacent properties. These roads generally support heavy truck traffic and bus routes. Minor arterials may serve between 5,000 and 20,000 vpd. Major arterials (e.g. provincial highways) may serve between 10,000 and 20,000 vpd (Ref. 18).

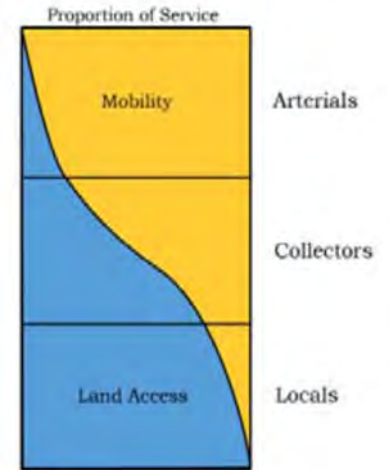


Figure 28: Arterial Road Example – Greig Avenue

Collector Roads: intended to connect neighbourhoods to the arterial road network with a moderate degree of traffic mobility, while also accommodating a higher degree of property access. Collector roads are also typically used for bus routes, and may have some heavy truck traffic (especially in industrial areas). Collectors typically serve between 1,000 and 12,000 vpd (Ref. 18).



Figure 29: Collector Road Example – Munroe Street

Local Roads: intended primarily to provide access to adjacent properties. On local roads, there is generally less tolerance for large volumes of traffic and fast traffic speeds. Local roads are often candidates for traffic calming measures (see Section 10.2), especially in residential areas. Traffic volumes on local roads are typically less than 3,000 vpd (Ref. 18).



Figure 30: Local Road Example – Cooper Drive

In revisiting the existing functionally classified network from the Terrace Official Community Plan (Ref. 14), the following three principles were considered:

1. The major road network should achieve a balanced spacing to provide a sufficient level of network redundancy to permit multiple route options for each trip.
2. The arterial and collector roads should interconnect with other similar roads wherever possible, thereby forming a continuous network with no unconnected streets.
3. The roads should ideally have the design characteristics, traffic control, and access density to support their functional classification.

The proposed functional classifications are shown in Figure 31. The most significant proposed change is the completion of the designated arterial road network on the Upper Bench, in the north half of the city. Halliwell Avenue is the only available east-west link that interconnects the three arterial routes to the city core (i.e. Kalum Lake Road, Lanfear Drive, and Skeenaview Drive). The high residential access density on the north side of Halliwell Avenue (between Sparks Street and Thomas Street) is undesirable for an arterial road. However, the access density on the south side of the road is much lower due to residential properties being accessed via side-streets. As the area develops, direct access should be discouraged in favour of more side-streets.

The proposed changes to the collector road network are primarily intended to establish a more defined and continuous grid network in the city, which is achieved by linking collectors and arterials. Proposed new collectors therefore include:

- McConnell Avenue, between Sparks Street and Munroe Street
- Straume Avenue, between Kalum Street and Munroe Street
- Mountain Vista Drive, between Bailey Street and Floyd Street
- Medeek Avenue, between Kenney Street and Braun Street
- Graham Avenue, between Kalum Street and Kenney Street

Braun Street between Keith Avenue and Highway 16, is also designated as a future collector, together with the future proposed grade separation of the railway line. This would become the future designated truck route (see Section 5.7).

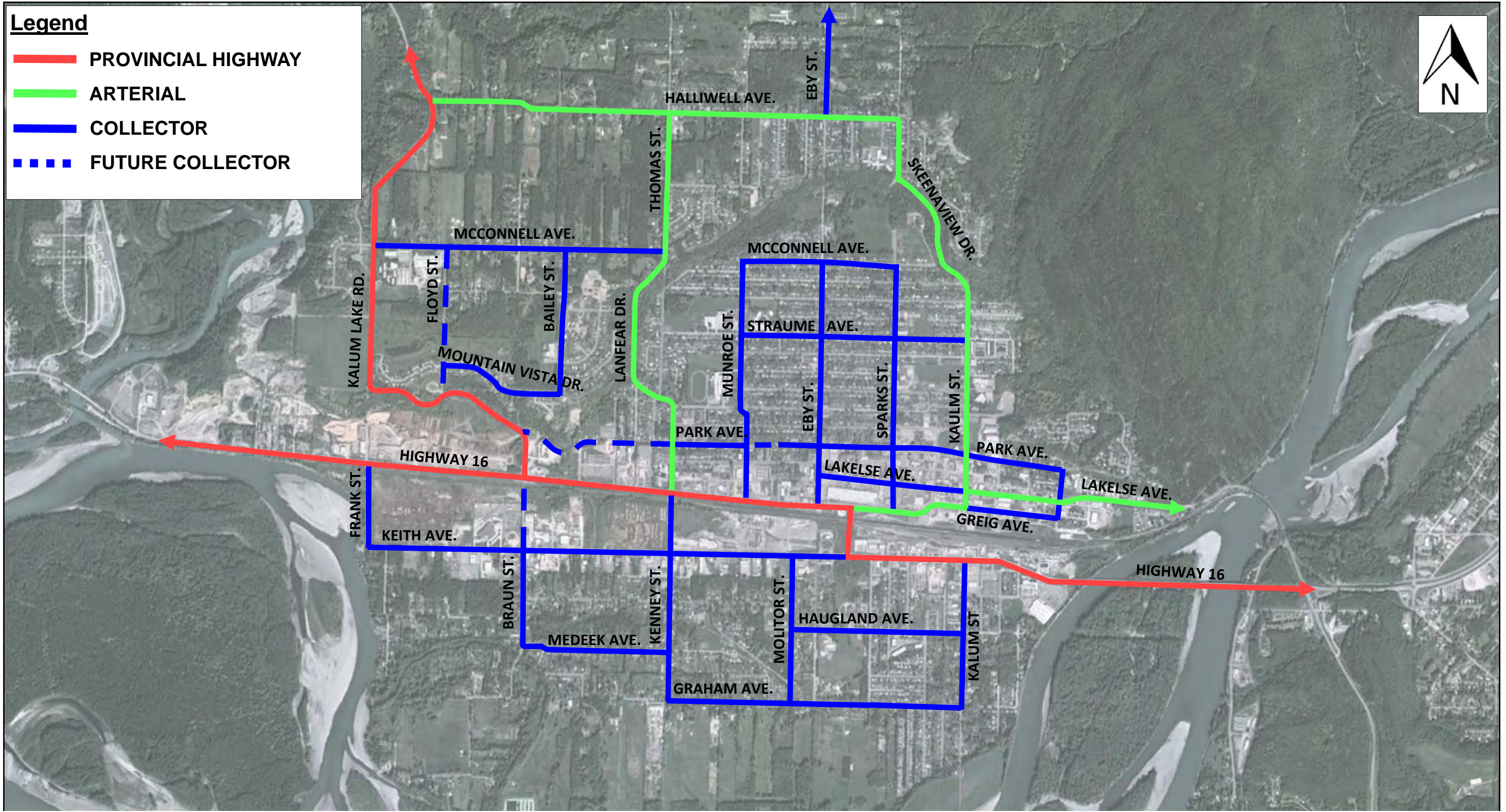


Figure 31: Proposed Road Functional Classification

5.2 ROAD CROSS SECTIONS

Schedule “I” of the Subdivision and Development Bylaw (Ref.16) identifies two standard widths for road right-of-way in Terrace: 20 metres and 24 metres. With the 20 metre right-of-way, there are currently provisions for 7.5 metre, 9.0 metre, 12.0 metre, and 14.0 metre road widths. Within the 24 metre right-of-way, the standards show an 18 metre road width.

For local roads, a 7.5 metre road width would be suitable providing there was little or no demand for on-street parking (Figure 32).

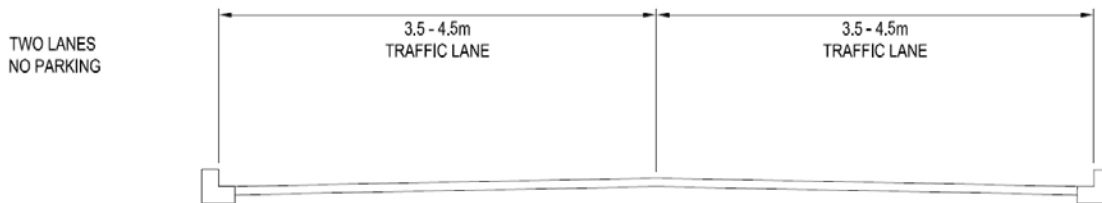


Figure 32: Local Road Cross Section (7 - 9 metre width)

To accommodate on-street parking (which typically requires in the order of 2.4 metres width), the road width should be between 9.0 and 10.0 metres (Figure 33).

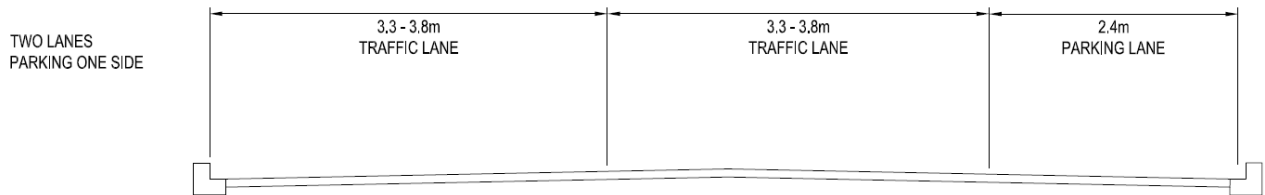


Figure 33: Local Road Cross Section (9 – 10 metre width)

For collector roads, additional width is usually required for turning lanes, on-street parking, bike lanes, and/or bus stops. Collector roads should therefore be typically between 10 metres and 13 metres in width, depending on their specific requirements. Proposed cross sections for collector roads are shown in Figures 34 to 36 below.

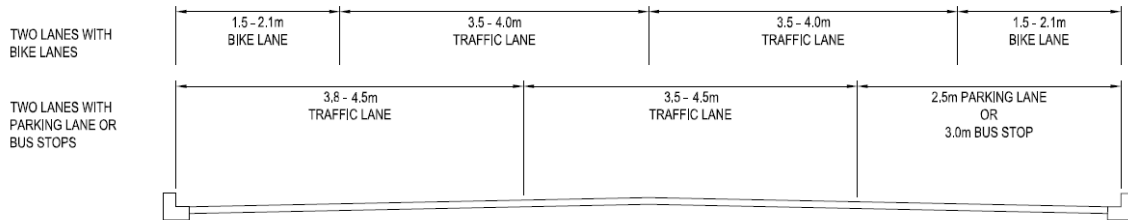


Figure 34: Collector Road Cross Section (10 – 12 metre width)

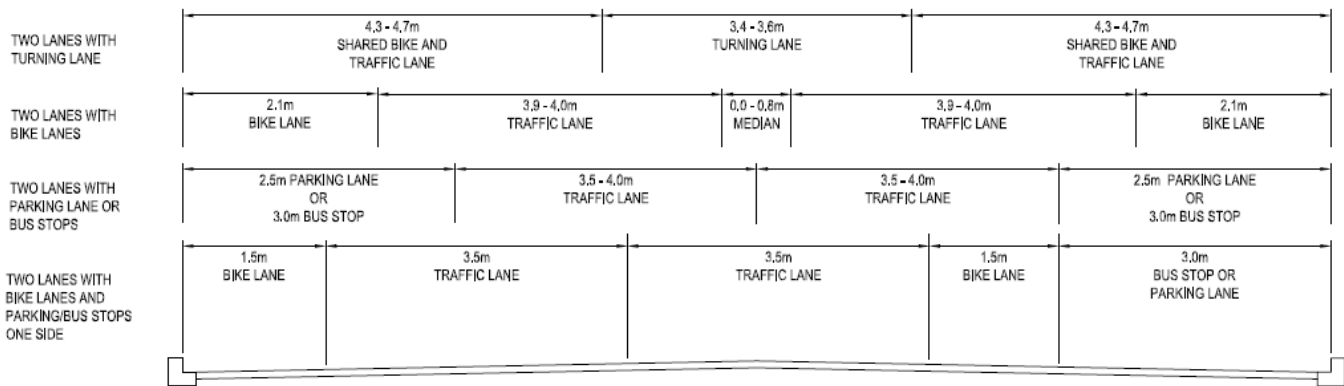


Figure 35: Collector Road Cross Section (12-13 metre width)

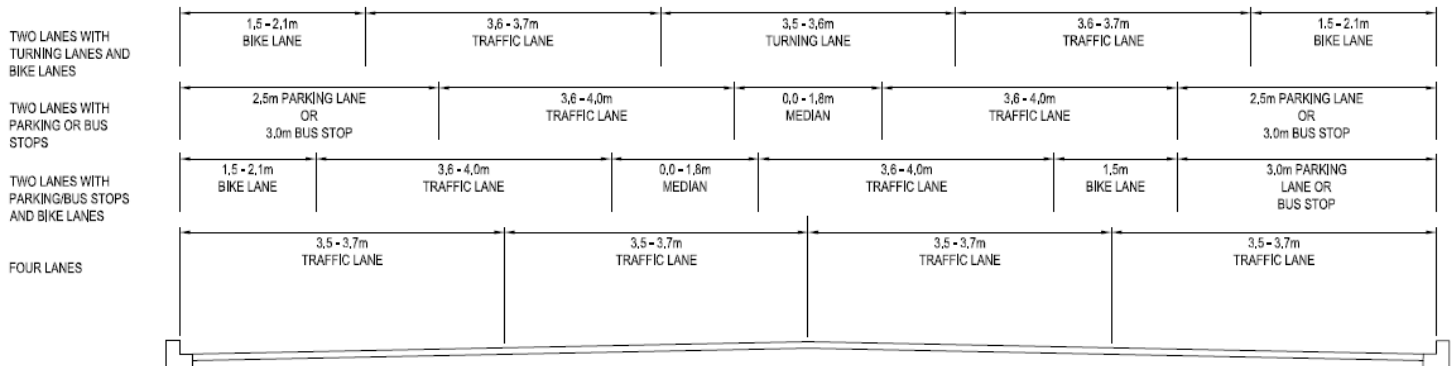


Figure 36: Collector Road Cross Section (13-14 metre width)

For two-lane arterial roads, the road width should be a minimum of 10 metres, with extra width to accommodate left turn lanes, etc. Potential arterial road cross sections can be similar to those for collector roads (as shown in the figures above), with additional width as required to accommodate additional traffic lanes and on-street parking.

The streets in Terrace that have identified issues with cross sections are:

1. Lakelse Avenue, a collector which currently accommodates four lanes of traffic and on-street parking on both sides in approximately 17 metres of width (Figure 37). There is insufficient road width for the current laning, as is evident from the concerns about weaving, turning, and parking conflicts. This will become a growing safety concern as traffic and parking demand increase. The road is a candidate for a “lane diet” (i.e. two traffic lanes with a Two-Way Left Turn Lane, with either on-street parking or bike lanes).



Figure 37: Lakelse Avenue

2. Lanfeair Drive and Skeenaview Drive: both roads are classified as arterials, but have right-of-way and topographical constraints that prevent construction of a standard road width. The roads do not require turning lanes, since there are no accesses or intersections on the hills. Therefore, to accommodate simply the traffic lanes and shoulders (or bike lanes), the road width should be ideally 10.0 metres.
3. Keith Avenue: with the development of the proposed Keith Estates, there will be increasing traffic, pedestrian, and cycling demands on Keith Avenue. The road will also be used by heavy trucks, especially if it is officially designated as a truck route. Therefore, a 14.6 metre road width in a 24 metre right-of-way is proposed. This will accommodate two lanes of traffic, a Two-Way Left Turn Lane (which is necessary with the high density of access along Keith Avenue), and two 1.8 metre shoulders (which could be used as bike lanes, or simply as a buffer for pedestrians). On-street parking should not be permitted in order to eliminate parking conflicts, and maintain sight lines at intersections. The boulevard could be used for two 1.8 metre sidewalks, or one 1.8 metre sidewalk and a 3.0 metre multi-use trail on the north side. Both options are shown in Figure 38.

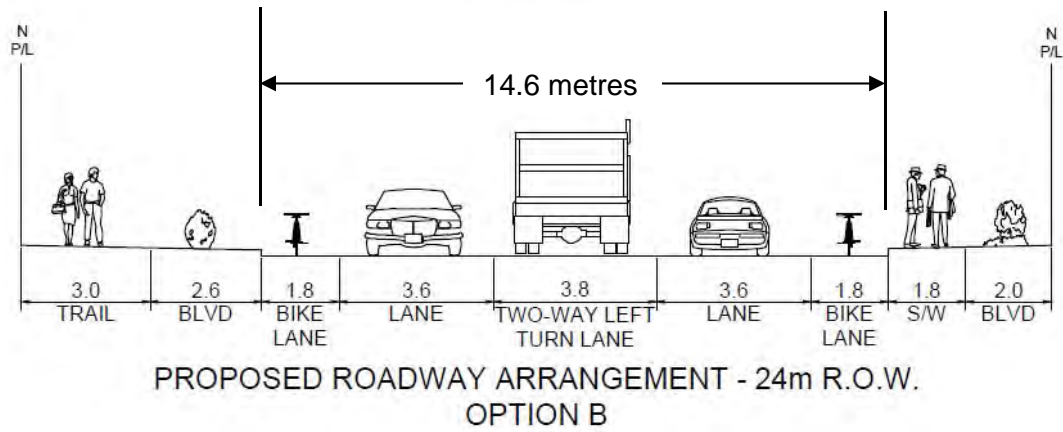
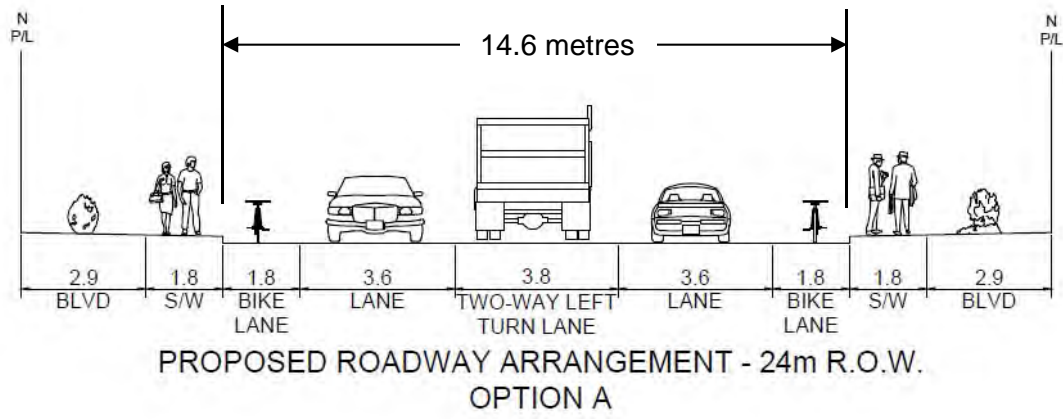


Figure 38: Proposed Cross Section Options for Keith Avenue

5.3 ROAD CAPACITY ANALYSIS

The theoretical maximum capacity of a lane of road is approximately 1,800 vehicles per hour, which is based on a 2 second headway between vehicles. However, this traffic demand would create heavily congested conditions. Furthermore, the actual road capacity is influenced by other factors, such as turning movements at accesses and intersections, the presence of trucks and other slow moving vehicles, and bus stops.

In the Lower Mainland, the accepted practice is to target a maximum traffic demand of between 800 and 1,000 vehicles per lane per hour (i.e. a vehicle approximately every 3-4 seconds). In Terrace, a more acceptable maximum is assumed to be closer to 600 vehicles per lane per hour (i.e. a vehicle approximately every 6 seconds).

Evaluating the estimated 2025 traffic volumes in Figure 27, all roads in Terrace are projected to have sufficient capacity for the traffic volumes except for Lanfear Drive (Figure 39). With the anticipated growth in the Upper Bench, Lanfear Drive is estimated to have over 700 vph southbound in the morning peak hour, and over 600 vph northbound in the afternoon peak hour. If peak hour traffic congestion becomes a concern for residents, it is likely that many will divert to alternate routes (i.e. Kalum Lake Road and Skeenaview Drive), both of which have available capacity.

In any case, this analysis underscores the importance of improvements on Lanfear Drive to ensure the road has the necessary width and geometry to safely accommodate the future peak hour traffic demand. The improvements on Lanfear Drive may be considered a higher priority than improvements to Skeenaview Drive due to the higher demand, and the more challenging geometry.



Figure 39: Road Capacity Issues on Lanfear Drive

5.4 INTERSECTION ANALYSIS

Most intersections in Terrace should accommodate the increased traffic demand shown in Figure 27, due to the excess road capacity currently available. The intersections which had identified issues with traffic capacity are as follows:

1. Keith Avenue at Kenney Street: the current traffic demand causes peak hour delays in excess of 30 seconds on Keith Avenue, and satisfies the TAC volume warrants for a four-way stop. The existing two-way stop would cause the intersection performance to fail under the estimated 2025 traffic demand. The future traffic patterns will also warrant left turn lanes on all approaches, and a right turn lane on the westbound approach, which will be triggered by excessive delays and queue lengths. The intersection will likely be a candidate for future signalization or a roundabout.
2. McConnell Avenue at Thomas Street: the offset T intersection at the top of Lanfear Drive (Figure 40) is currently operating well, although is the subject of concerns from residents as the traffic from the Upper Bench converges at this location. Peak hour delays on the eastbound approach are currently less than 15 seconds per vehicle, with an average queue length of two vehicles. No immediate improvements appear necessary. However, with the expected growth in the area, the average eastbound delay will gradually increase to 35 seconds by the horizon year, with queues up to six vehicles long. The future peak hour delay on the westbound approach will exceed 90 seconds, although the westbound traffic volume is significantly less. A major intersection upgrade of the laning, geometry and traffic control will be required to accommodate the future traffic demand, and also address the offset T intersection with Cooper Drive.



Figure 40: McConnell Avenue at Thomas Street

3. Lanfeear Drive at Pheasant Street: the residents on Pheasant Street have identified a concern with high traffic speeds, especially from southbound vehicles traveling between Lanfeear Drive and the retail development on Highway 16. While traffic counts indicate the current turning volumes at the Lanfeear Drive/Pheasant Street intersection are low, more drivers may choose to divert through Pheasant Street in the future as the traffic volumes increase.
4. Lazelle Avenue at Kenney Street: at the bottom of Lanfeear Drive, traffic traveling to and from the Downtown is likely to turn at Lazelle Avenue. This pattern was reflected in the higher traffic volumes at the Lazelle Avenue / Eby Street intersection. If this route remains preferred by traffic, a southbound left turn lane will likely be warranted to separate turning movements from the through traffic for safety and operational reasons. This improvement will be triggered by the growth of queues behind southbound left turning vehicles on Kenney Street.
5. Lazelle Avenue at Eby Street: as discussed above, this intersection is part of the connection between Lanfeear Drive and the Downtown. The four-way stop control may not sustain future traffic demand as the Upper Bench develops. However, any modifications at this intersection must be in consideration of the intersection of Lakelse Avenue and Eby Street immediately to the south.
6. Lakelse Avenue at Eby Street: the traffic control at Lakelse Avenue / Eby Street (Figure 41) gives priority to Lakelse Avenue traffic (i.e. the stem of the T intersection), which is not considered intuitive for drivers according to TAC guidelines. The increasing traffic demand is expected to cause the intersection performance to fail by 2025, requiring a major upgrade to the traffic control (e.g. signal or roundabout). However, any modifications at this intersection must be in consideration of the intersection of Lazelle Avenue and Eby Street, immediately to the north.



Figure 41: Lakelse Avenue at Eby Street

7. Lakelse Avenue at Sparks Street: the heavier traffic demand expected in the Downtown will exacerbate the delays already incurred by the split signal timing necessitated by the offset T intersection. Heavier volumes on the skewed north-south movement will also invite safety concerns.
8. Lazelle Avenue at Sparks Street: the existing four-way stop is expected to continue to perform at an acceptable Level of Service, with average delays less than 15 seconds per vehicle during peak hours. However, any major changes to the Lakelse Avenue / Sparks Street intersection may have a downstream impact at this location.
9. Lakelse Avenue at Kalum Street: as a major junction between the Old Skeena Bridge, the Downtown, and the Upper Bench (via Skeenaview Drive), the intersection of Lakelse Avenue and Kalum Street will have a significant traffic demand. The reduced laning at the entrance to the 4600 Block of Lakelse Drive will also constrain capacity.
10. Skeenaview Drive at Munthe Avenue: the existing turning volume of traffic turning left from Munthe Avenue onto Skeenaview Drive (Sparks Street/Skeenaview) is low. Although the sight lines looking south are restricted by the road alignment, a mirror at the intersection has allowed the intersection to operate relatively safely. However, as traffic volumes increase to and from the Upper Bench, the capacity for these left turns will decrease with the available gaps in traffic. The trigger will be excessive peak hour delays and queues on Munthe Avenue, and potential safety concerns.
11. Highway 16 / Kalum Lake Road: The Highway 16 corridor is the subject of a separate study, so the highway intersections were largely omitted from this analysis. However, one notable issue is the expected heavy southbound left turning volume at the intersection of Highway 16 and Skeenaview Drive. This extra traffic demand would arise directly from the development of the Upper Bench, and would cause the intersection to warrant signalization. If that traffic signal was implemented as part of a rail overpass solution, a significant volume of traffic would divert to this location, and improve the Level of Service on other corridors.
12. Lazelle Avenue at Emerson Street: the intersection of Lazelle Avenue at Emerson Street is currently signalized, but the existing and expected future traffic volumes appear to be less than necessary to meet the warranting criteria for signalization. An unwarranted signal can create unnecessary traffic delays, which may invite non-compliance of the traffic control devices. However, there may be reasons unrelated to traffic demand to keep the traffic signal, such as safety, accessibility, or anticipated future development that would change existing traffic patterns. The intersection should be studied in detail at an operational level before the signal should be considered for removal.

5.5 NEW NETWORK LINKS

Based on the background literature, the traffic analysis, and the road classification (Figure 31), there is an apparent need for five new road links in the Terrace Road network:



Figure 42: Proposed Kalum Lake Rd Overpass

1. Kalum Lake Road should be connected to Braun Street across Highway 16 and the CN rail line (Figure 42). This is the most important new road link for the City in consideration of traffic capacity across the rail line, network reliability and redundancy, emergency response, neighbourhood connectivity, and the provision of truck routes.

2. Park Avenue should be extended between Eby Street and Munroe Street to provide an alternate route for traffic between Lanfear Drive and the Downtown. The importance of this extension will depend on the nature of the intersection upgrade at Lakelse Avenue and Eby Street, which will influence the available intersection capacity at Lazelle Avenue and Eby Street.

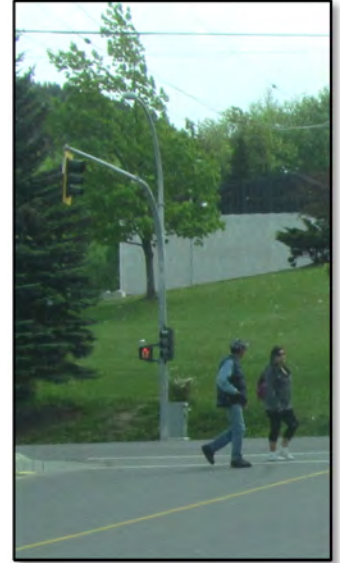
3. An extension of Park Avenue between Lanfear Drive and Kalum Lake Road is also proposed. This connection is desirable from a network connectivity perspective, especially insofar as it would help reduce the volume of local traffic on Highway 16. However, the traffic demand on this link is not likely to warrant this improvement within the study horizon.
4. The extension of Floyd Street between McConnell Avenue and Mountain Vista Drive was identified on the road functional classification. This road would have more importance for local neighbourhood traffic than it would for the greater network. Therefore, this link should be connected only as part of the development of the adjacent neighbourhood.
5. From the forecast volumes to and from the Upper Bench, there will be significant levels of congestion during the peak hours on the three existing routes, especially Lanfear Drive. The steep topography precludes the addition of new lanes on the existing roads. Therefore, a potential new route to the Upper Bench would have significant network benefits. Additional study is necessary to confirm if there are any opportunities for new alignments.

5.6 DOWNTOWN MULTI-MODAL TRANSPORTATION REVIEW

More than any other neighbourhood in Terrace, the Downtown should be safe and accessible for pedestrians. This is not only because of the large volume of pedestrians and transit users in the area, but also because the Downtown needs to have a people-oriented sense of place to realize its potential as the City Centre.

The Downtown street network is well-established, with a series of relatively short blocks that facilitate pedestrian traffic. All roads align well with each other except for the intersections of Lakelse Avenue/Sparks Street and Park Avenue/Sparks Street. With the exception of the former, the current traffic control in the Downtown intersections appears to be operating well, and should generally accommodate the forecast city growth.

All roads in the Downtown have hard-surfaced sidewalks which are typically wide and/or buffered from the street by landscaped boulevards. Furthermore, wheelchair ramps are standard on every street corner. Curb extensions (or “sidewalk bulbs”) are available at numerous intersections, but not all. These are one of the most effective means of calming traffic, and improving the safety of the streets for pedestrians.



Almost all roads in the Downtown are two-lanes. Two exceptions to this are Lakelse Avenue (except between Kalum Street and Emerson Street) and Kalum Street (south of Park Avenue). Both of these roads are four lanes, and both have identified conflicts with weaving manoeuvres, on-street parking, and turning movements.

According to the current bicycle network (see Section 7.1), the formal cycle routes through the Downtown are planned to be Park Avenue and Kalum Street. These roads should be reconfigured to accommodate cyclists with dedicated bike lanes (see Section 5.2). The cycle mode can further be accommodated in the Downtown with the provision of convenient and secure bike racks, especially at key destinations.

The Downtown is currently well-served by the Terrace transit system, with all local routes connecting to the Downtown Core. As the community grows, additional bus routes, bus stops and potentially a central transit exchange should be implemented as required, maintaining the Downtown as the hub.

In light of the above, the traffic, transit, cycle and pedestrian movement within the Downtown could be improved for with the following measures:

1. “Lane diets” on the four-lane sections of Kalum Street and Lakelse Avenue.
2. Realignment of the intersections of Lakelse Avenue/Sparks Street and Park Avenue/ Sparks Street.
3. Formalized bike lanes along the Park Avenue and Kalum Street routes.
4. Improved traffic calming at intersections through the installation of curb extensions wherever possible.

5.7 TRUCK ROUTE ANALYSIS

A truck route is a designated route through or around a community which is designed and maintained to facilitate the movement of heavy industrial and commercial traffic. The purpose of a truck route is to separate the heavy trucks (and ideally the dangerous goods carriers) from the more developed and populated neighbourhoods in the city. The routes can be offered as a preferred alternative for truckers, or can have their use mandated and regulated through city bylaws.

By definition, truck and/or dangerous goods routes are only intended for through traffic (i.e. trucks with origins and destinations outside the city limits). Any truck trips starting or ending their journey within Terrace (e.g. local industries, service stations, shopping centres, arenas, etc) will necessarily have to divert from the designated network, preferably via the shortest and safest route.

The provincial highways are, by MoTI policy, open for use by all legal trucks and dangerous goods carriers (Figure 43). In this respect, Hwy 16, Hwy 37, and Kalum Lake Road (Hwy 113) are currently designated truck routes through Terrace. These routes inherently serve through traffic by virtue of continuing to regional destinations outside the city limits.



Figure 43: Highway 16 (Keith Avenue) at Sande Street

The only apparent candidate for a secondary truck route is Keith Avenue, which offers an alternative route around the city core. Keith Ave also has a straight alignment, and passes through the industrial area. The disadvantages of Keith Avenue as a truck route are the narrow road width, and the need to cross the railway tracks (at either Kenney Street or Frank Street) to connect to Highway 16. In the stakeholder consultation, the trucking representatives identified a safety concern with trucks crossing the tracks immediately before a traffic signal (i.e. the existing signal at Highway 16 / Kenney Street, or the new signal at Highway 16 / Frank Street). This concern is exacerbated for dangerous goods carriers.

Keith Avenue, Kenney Street, and Frank Street will continue to be routes that are heavily used by trucks, and afford community benefits by diverting trucks around the city core. However, these roads should not be officially designated as a truck route for the purpose of regulation and enforcement until a second rail overpass can be built (e.g. at Kalum Lake Road). At that time, Keith Avenue can be designated as an official truck and/or dangerous goods route (Figure 44).

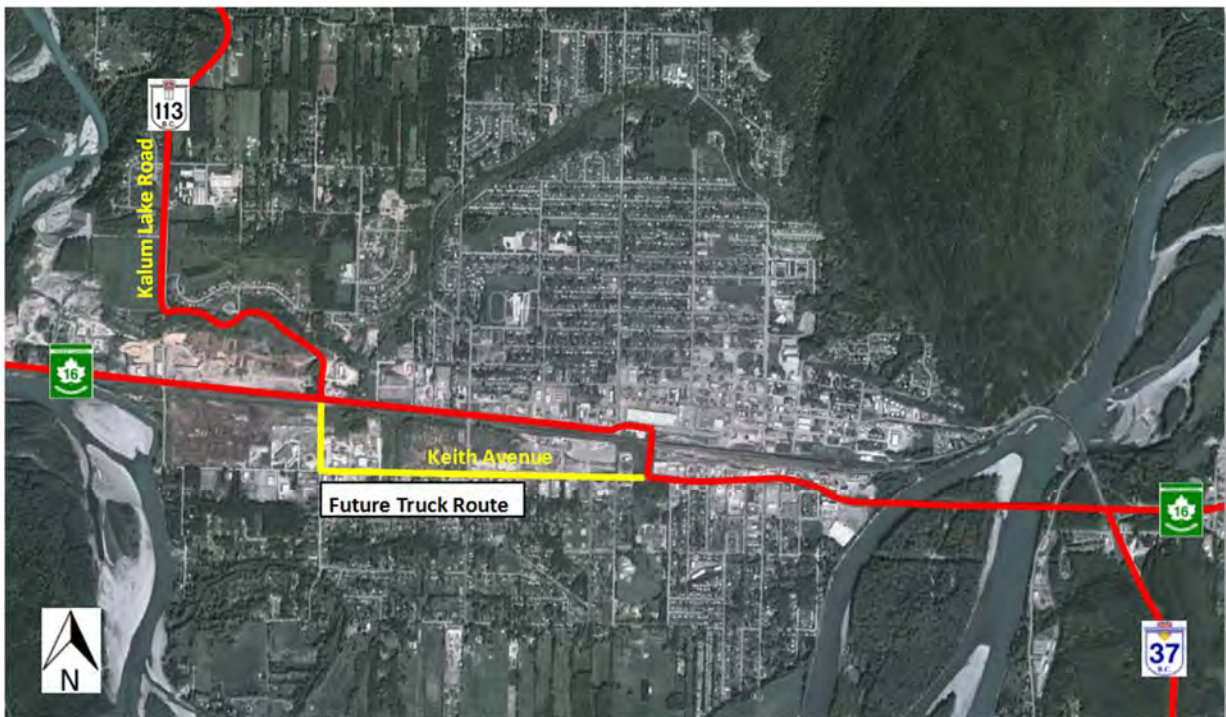


Figure 44: Truck Routes Through Terrace

6 ROAD SAFETY ANALYSIS

To analyze the safety of the Terrace transportation system, a comprehensive Road Safety Analysis was completed in accordance with criteria established by the Insurance Corporation of British Columbia (ICBC). The analysis was divided into an evaluation of overall trends, and a formal network screening to identify and study the top 20 collision-prone locations in the city.

6.1 GENERAL COLLISION ANALYSIS

There were a total of 13,755 collisions recorded in ICBC’s database between January 1st, 1996 and November 17th, 2013 (the latest records available) within the greater Terrace area. Of these, there were 7,251 collisions (i.e. 53%) classified as motor vehicle incidents unrelated to parking manoeuvres, and 6,504 collisions (i.e. 47%) classified as occurring due to parking manoeuvres.

The annual number of non-parking related collisions on public roadways since 1996 has generally fluctuated between 300 and 500 per year (Figure 45). Using population data from Census Canada as an indicator of the traffic activity in Terrace, the annual collision frequency appeared to rise and fall with the population until the mid-2000s. After this period, a decrease in population did not appear to have an effect on the collision frequency, which increased to approximately 400 collisions per year.

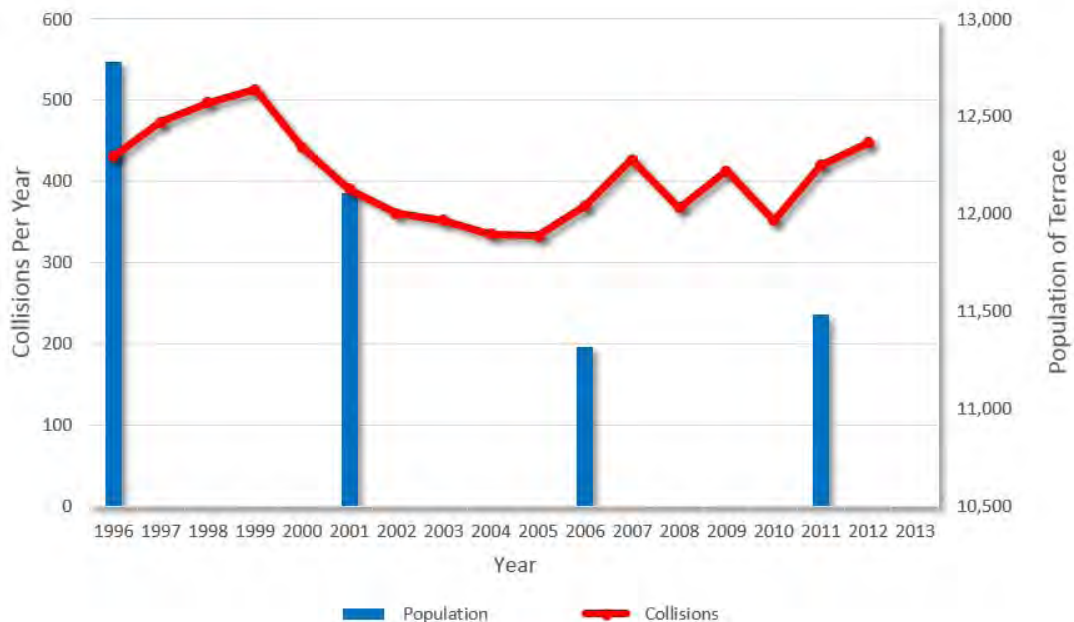


Figure 45: Annual Collision Frequency and City Population
(source: ICBC Collision Data and Census Canada)

To evaluate the recent collision trends, a detailed analysis of the last five years of collision data (i.e. November 18th, 2008 to November 17th, 2013) was completed. To focus the analysis on traffic incidents, the records concerning parking manoeuvres have been removed for separate consideration in Section 6.3. The results are outlined in the following sections.

6.1.1 Monthly Collision Trends

On a seasonal basis, the collision frequency during the winter months is typically 30% to 50% higher than the annual monthly average (Figure 46). This is largely a reflection of the effect of winter road conditions in a northern climate. The probability of precipitation is higher in winter, and the average daily temperature in Terrace is below freezing between November and February. This trend underscores the importance of winter road maintenance operations in traffic safety.

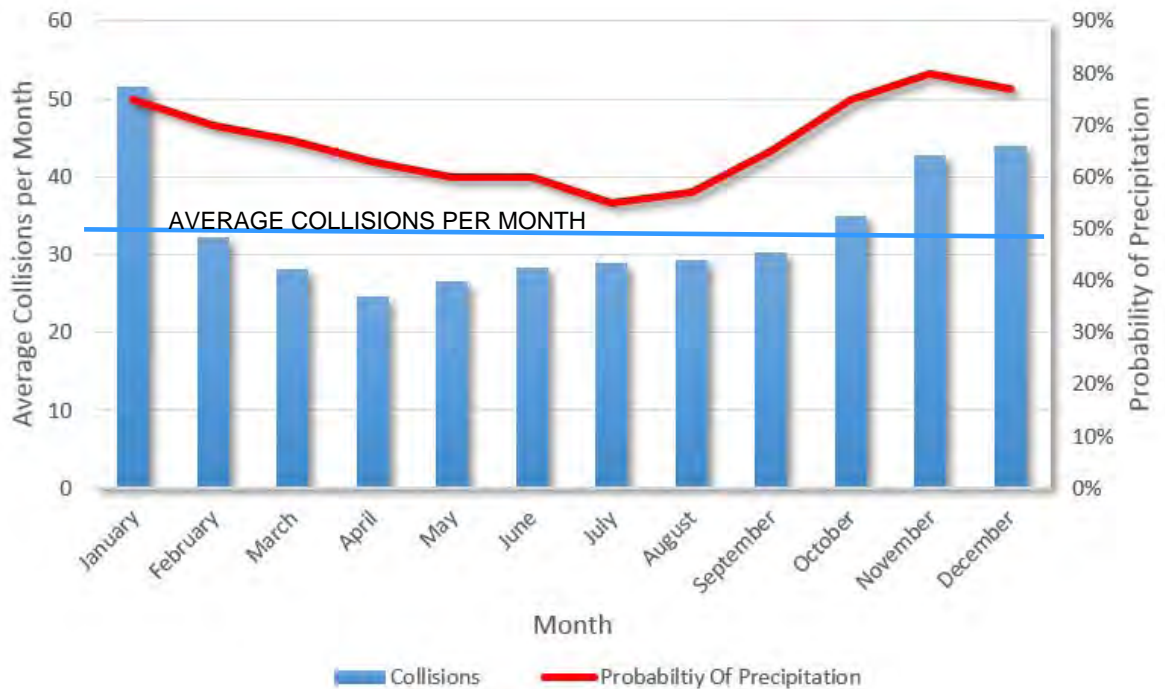


Figure 46: Monthly Collision Frequency and Probability of Precipitation
(source: weatherspark.com)

6.1.2 Daily Collision Trends

More collisions occur on Fridays, which is typically when the roads have higher traffic volumes (Figure 47). Collision frequencies are lowest on Sundays when volumes are less.

In the absence of a permanent traffic count station in Terrace, these trends could not be compared to the daily traffic volume patterns.

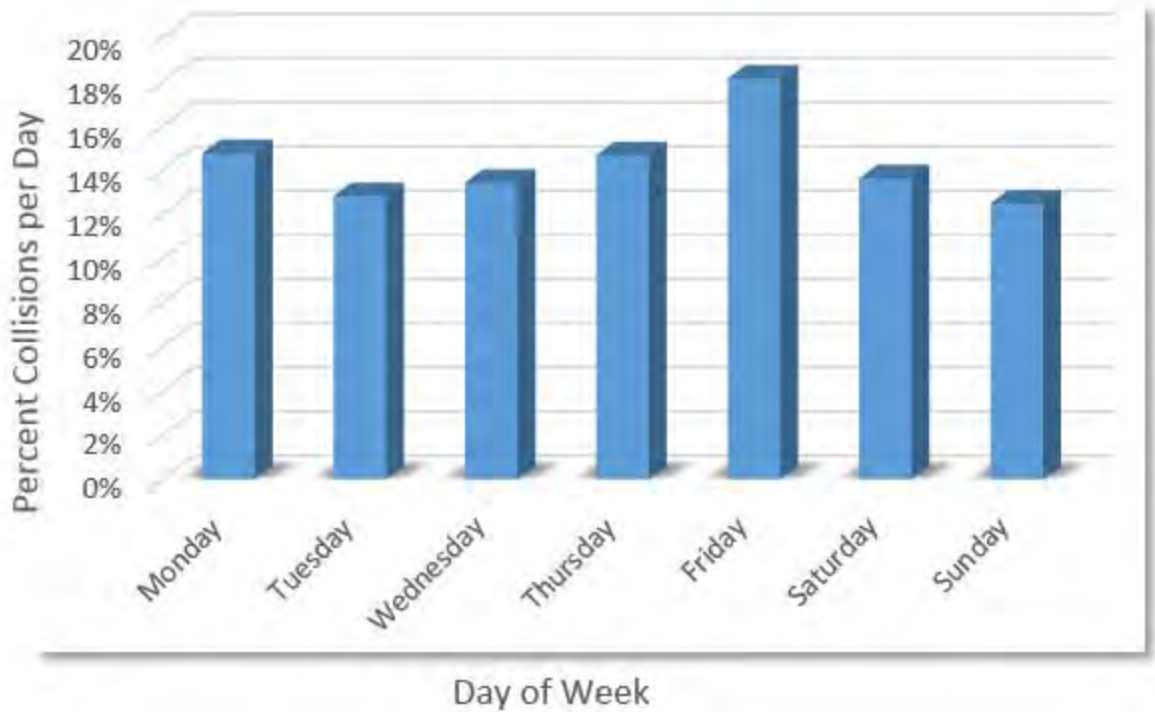


Figure 47: Percent of Collisions by Day of the Week

6.1.3 Hourly Collision Trends

When analyzed by hour of the day, the collision statistics indicate a spike in collision frequency in the morning and afternoon peak hours (Figure 48). In general, there is a strong correlation between the collision frequency and the local traffic volumes (as measured on Highway 16 at the Kenney Street intersection), indicating, as expected, that the frequency of collisions in Terrace is generally a function of the traffic exposure.



Figure 48: Percent of Collisions and Traffic Volume by Hour of the Day
(Source: MoTI Count Station 48-923EW on Highway 16 at Kenney Street, July 2014)

An exception to this is in the late evening hours, when the number of collisions increases relative to the traffic volume. This may be attributed to a number of reasons, including driver fatigue, darkness and/or poor lighting, and the potential for higher traffic speeds in the absence of heavy traffic volumes.

6.1.4 Collision Trends by Severity

Approximately 75% of all non-parking related collisions in Terrace during the analysis period were classified as Property Damage Only, in which only vehicle or other property damage was involved (Figure 49). The majority of the remainder involved an injury of some kind.



Figure 49: Collision Severity

There were eight fatal collisions (i.e. 0.4%) reported in the Terrace area, in which at least one person died as a result of the collision. From the available data, the exact locations were not always apparent. Those fatal collisions which were potentially within the city limits involved the following:

1. An off-road incident on Kalum Lake Road on a Saturday night in June 2013.
2. An off-road incident on Highway 16 on a Saturday afternoon in August 2012.
3. A head-on collision on Highway 16 on a Saturday afternoon in July 2011.
4. A head-on collision on Highway 16 on a Saturday afternoon in June 2010.
5. A left turn collision at Eby Street / Scott Avenue early in the evening on a Friday in May 2010.
6. A heavy truck incident on Highway 16 in slushy conditions involving an unsecured load on a Monday morning in January 2013.
7. A collision with a pedestrian at an unidentified location in the late evening on a Tuesday in June 2012.

The majority of fatalities occurred on the highways, where the traffic speeds are higher. Also, five of the eight fatal collisions occurred on summer weekends.

6.1.5 Collision Trends by Mode

Over 90% of the collisions were between automobiles, as would be expected from the relative proportions of vehicles on the road (Figure 50). The number of collisions involving cyclists, pedestrians, and motorcycles was relatively low. For motorcycles and cyclists, this is likely a function of exposure, as fewer people typically use these modes in northern climates.

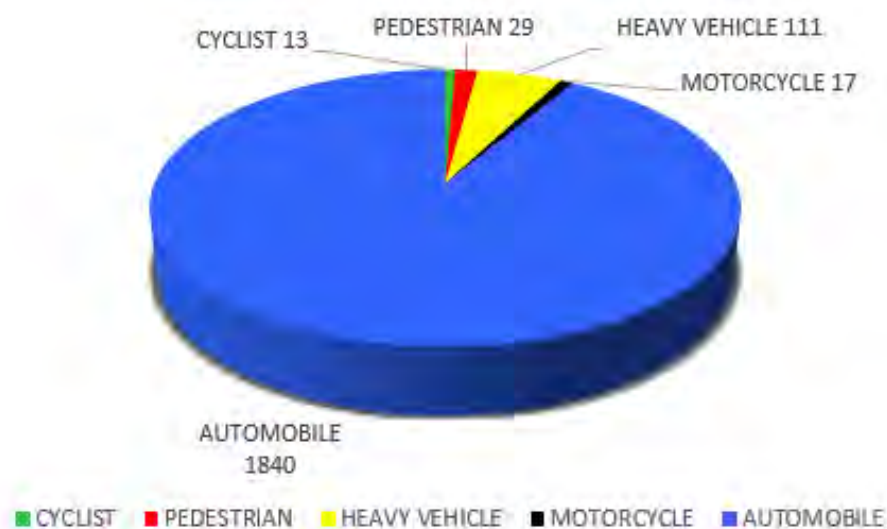


Figure 50: Collisions by Mode

Some of the apparent trends involving non-automobile users were as follows:

- Most of the 13 bicycle collisions in Terrace were Downtown (i.e. Lakelse (5); Lazelle (2); Kalum (3)), all occurring between the months of April and October. This may indicate a need for more safe cycling facilities Downtown.
- The 29 pedestrian collisions were concentrated on the main pedestrian corridors and crossing locations (i.e. Kalum Street (7); Lakelse Avenue (4); Eby Street (3); and Kenney Street (2)). There was also a pedestrian incident on Haugland Avenue at the hospital, where the public and stakeholders have expressed concerns about pedestrian safety. Approximately 25% occurred during hours of darkness.
- As expected, the majority of the collisions involving heavy trucks occurred on the major truck routes (i.e. Highway 16 (43); Highway 37 (7); Kalum Lake Road (3); and Keith Avenue (5)). There were also three heavy vehicle incidents reported on Lakelse Avenue in the Downtown, two of which involved turning at the Kalum Street intersection.
- There were no apparent locational trends in the motorcycle-related collisions. All occurred between the months of April and September, six of which involved drivers losing control.

6.2 NETWORK SCREENING

Based on the most recent five years of available ICBC collision data, 20 intersections were identified for further study, applying the following methodology:

1. A list of 30 intersections was generated by discarding all identifiable locations with less than four non-parking related collisions.
2. The traffic volume at each intersection was determined by traffic counts (where available), or estimated from counts at nearby locations (e.g. City hose counts). A K Factor of 10 was used to estimate Annual Average Daily Traffic (AADT) from the peak hour data.
3. A **Collision Rate** (i.e. number of collisions per million entering vehicles over the five year study period) was calculated for each intersection. This measure normalizes the data such that the collision history at a given location is considered in the context of its exposure to traffic volumes. The intersections were then ranked from the highest to the lowest Collision Rates.
4. A **Severity Index** was calculated for each intersection by assigning a weighting of 600 to each fatal collision, 20 to each injury collision, and 1 to each collision with property damage only. These weightings are intended to reflect the relative societal costs of each type of collision (Ref. 17). The intersections were then re-ranked from the highest to the lowest Severity Index to identify locations where the severity is of greater concern.
5. A **Critical Collision Rate** was calculated for each intersection. This calculation uses the Average Collision Rate for similar intersections to determine the threshold collision rate for the subject intersection (based on its traffic volume), above which the location may be considered problematic (with a 95 percent confidence). The most recent ICBC figures for Average Collision Rates in BC for signalized and stop-controlled intersections are 1.75 and 1.02 collisions per million-entering vehicles respectively. As these rates are generally far above the rates for the Terrace intersections, local Average Collision Rates were calculated from the list of top 30 intersections. The results were 0.99 and 0.40 collisions per million-entering vehicles for signalized intersections and stop-controlled intersections respectively.

With the Critical Collision Rates, the **Critical Collision Rate Index (CCRI)** was calculated as the ratio of the actual Collision Rate at each intersection to the applicable Critical Rates. Values exceeding 1.0 indicated a potential concern. The list of 30 intersections was then re-ranked according to the CCRI scores.

6. With the three rankings, a combined ranking (with equal weightings) was calculated to prioritize the Top 30 intersections. Only the Top 20 were advanced for further study, as discussed in the following sections. These, and their respective indices, are summarized in Table 9.

Table 9: Identified Intersections for Study

Rank	Intersection Location	Traffic Control	AADT (vpd)	Collision Frequency	Collision Rate	FAT.	INJ.	PDO	Severity Index	Critical Rate	CCRI
1	Hwy 16 at Kenney Street	Signal	12,000	31	1.42	0	10	21	221	1.36	1.04
2	Keith Ave at Kenney St	Stop (2 way)	8,200	19	1.27	0	9	10	190	0.70	1.80
3	Hwy 16 (Keith Ave) at Kalum Street	Signal	17,000	34	1.10	0	13	21	281	1.30	0.84
4	Lazelle Avenue at Kalum Street	Stop (2 way)	9,600*	16	0.91	0	6	10	130	0.68	1.34
5	Park Avenue at Kalum Street	Signal	9,600	21	1.20	0	5	16	116	1.41	0.85
6	Scott Avenue at Eby Street	Stop (2 way)	3,500*	4	0.63	1	1	2	622	0.89	0.70
7	Hwy 16 at Munroe Street	Stop (2 way)	9,800*	14	0.78	0	3	11	71	0.68	1.16
8	Lakelse Avenue at Kalum Street	Signal	11,000	18	0.90	0	4	14	94	1.38	0.65
9	Hwy 16 at Sande St/Greig Ave	Signal	18,300	23	0.69	0	9	14	194	1.29	0.54
10	Haugland Avenue at S. Kalum Street	Stop (2 way)	4,000*	5	0.68	0	4	1	81	0.86	0.80
11	Hwy 16 (Keith Ave) at Hall Street	Stop (2 way)	15,800	13	0.45	0	6	7	127	0.61	0.74
12	Hwy 16 at Eby Street	Signal	13,600	15	0.60	0	6	9	129	1.34	0.45
13	Walsh Avenue at Eby Street	Stop (2 way)	4,500*	4	0.49	0	4	0	80	0.83	0.59
14	Lakelse Avenue at Apsley Street	Stop (2 way)	7,500*	5	0.37	0	3	2	62	0.72	0.51
15	Lakelse Avenue at Sparks Street	Signal	9,400	10	0.58	0	3	7	67	1.41	0.41
16	Park Avenue at Kenney Street	Stop (2 way)	6,300*	4	0.35	0	4	0	80	0.75	0.46
17	Hwy 16 (Keith Ave) at Tetrault Street	Stop (2 way)	18,000*	11	0.33	0	3	8	68	0.60	0.56
18	Lazelle Avenue at Sparks Street	Stop (4 way)	7,500	5	0.37	0	1	4	24	0.72	0.51
19	Lakelse Avenue at Emerson Street	Signal	7,900	5	0.35	0	4	2	82	1.45	0.24
20	Straume Avenue at Kalum Street	Stop (2 way)	6,300*	4	0.35	0	2	2	42	0.75	0.46

* Annual Average Daily Traffic estimated from counts at adjacent intersections.

Approximately one-third of the collision records included latitude and longitude (i.e. GPS) locational referencing. This data is reflected in Figure 51, showing larger yellow circles for locations with higher collision frequency. This figure correlates well with the Top 20 list of study intersections, which are circled in red.

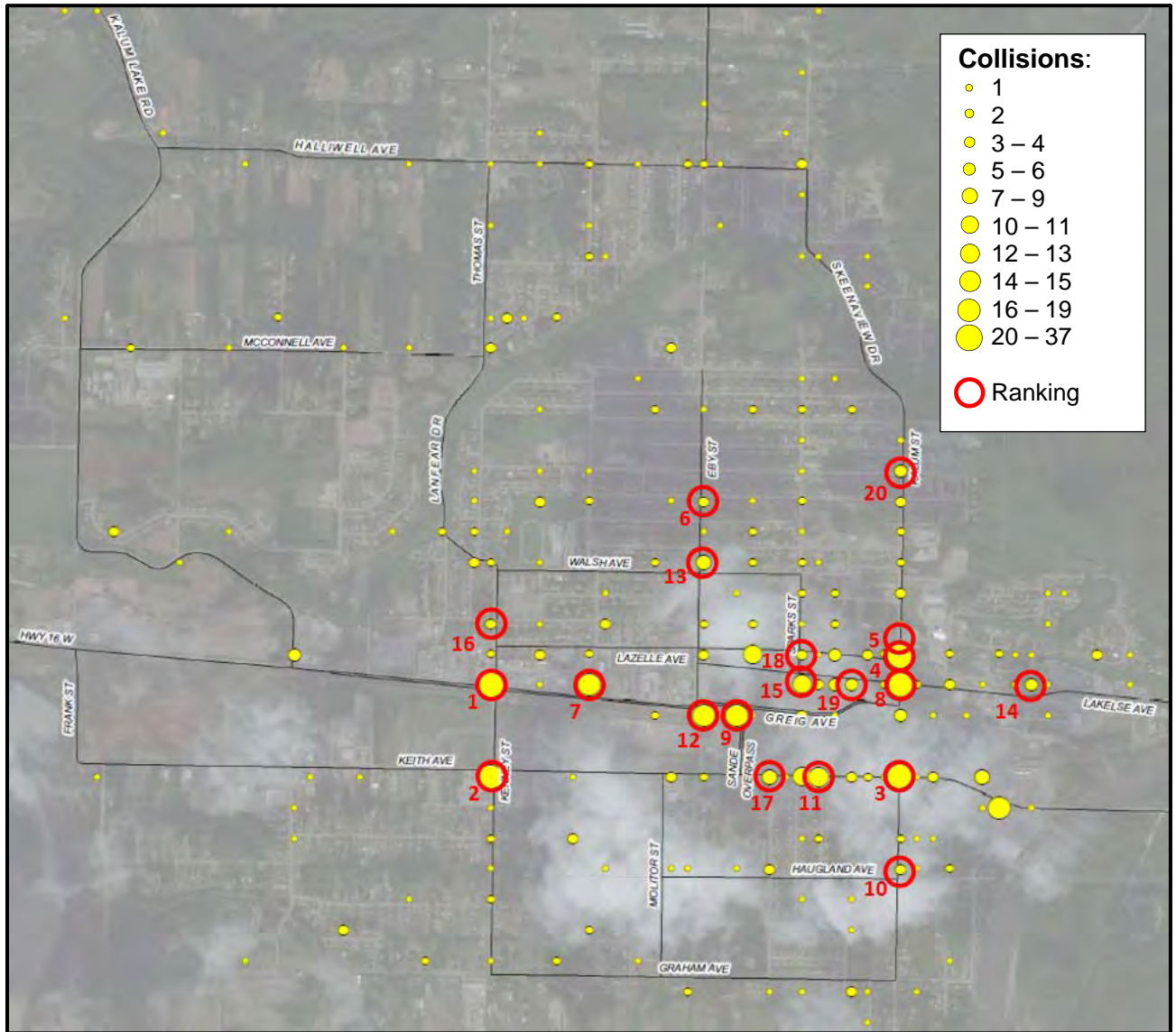


Figure 51: Relative Collision Frequencies at Intersections in Terrace

Following the analysis, the ten intersections discarded from the original list of 30 locations are shown in Table 10.

Table 10: Discarded Intersections

Intersection Location	Traffic Control	AADT (vpd)	Collision Frequency	Collision Rate	FAT.	INJ.	PDO	Severity Index	Critical Rate	CCRI
Hwy 16 (Keith Ave) at Sande Street	Stop (2 way)	18,900	14	0.41	0	4	10	90	0.59	0.68
Haugland Avenue at Tetrault Street	Stop (2 way)	4,500*	4	0.49	0	2	2	42	0.83	0.59
Hwy 16 at Kalum Lake Road	Stop (2 way)	5,500	4	0.40	0	1	3	23	0.78	0.51
Hwy 16 (Keith Ave) at Sparks Street	Stop (2 way)	17,000*	9	0.29	0	2	7	47	0.61	0.48
Greig Avenue at Kalum Street	Stop (2 way)	6,600*	4	0.33	0	3	1	61	0.74	0.45
Lazelle Avenue at Emerson Street	Signal	5,000	4	0.44	0	1	3	23	1.58	0.28
Davis Avenue at Kalum Street	Stop (2 way)	6,500	4	0.34	0	1	3	23	0.75	0.45
Scott Avenue at Kalum Street	Stop (2 way)	6,600	4	0.33	0	2	2	42	0.74	0.45
Lazelle Avenue at Eby Street	Stop (4 way)	8,400	4	0.26	0	1	3	23	0.70	0.37
Greig Avenue at Sparks Street	Stop (2 way)	9,300	4	0.24	0	0	4	4	0.68	0.34

* Annual Average Daily Traffic estimated from counts at adjacent intersections.

The intersection of Highway 16 (Keith Avenue) at Sande Street has sufficient scores to be included in the Top 20 list. However, since this intersection had substantial laning and geometric upgrades and a new traffic signal in 2015, this intersection was discarded from further analysis.

According to the stakeholders, a trend in eastbound left turn collisions has emerged since the intersection improvements, largely due to drivers' failure to adapt to the new traffic control, and their apparent confusion about the right-of-way. At the time of this report, MoTI was monitoring the situation and revisiting the signage to further clarify the traffic control.

6.2.1 Highway 16 at Kenney Street



Description:

The signalized intersection of Highway 16 and Kenney Street (Figure 52) is the first of two at-grade railway crossings west of the Sande Street overpass. The south leg connects to the Keith Avenue industrial area; the north leg connects to Lanfear Drive, which is the busiest of the three routes to the Upper Bench area. Consequently, the intersection has a significant traffic demand, with an estimated average daily entering volume of 12,000 vpd.

The highway has four lanes, with opposing left turn lanes. Kenney Street has dedicated right turn lanes, and shared left/through lanes. The posted speed on all approaches is 50 km/h, although the speed changes to 60 km/h just west of the intersection.

Figure 52: Highway 16 at Kenney Street

Collision Analysis:

Within the recent five year study period, there were 31 reported incidents (i.e. 6 per year on average), although there were 12 collisions reported in 2012. The obvious trends in the collision data were as follows (Table 11 and Figure 53):

1. There were 11 collisions which occurred between 3pm and 6pm, with no collisions reported in the late evening hours, suggesting illumination is not a concern.
2. The majority of collisions (17) occurred between Thursday and Friday, with relatively few occurring on weekends.
3. The collisions occurred in all seasons, although a significant proportion (12/31) occurred between September and October.
4. There were 8 rear-ends collisions on the northbound approach on Kenney Street. Drivers may be distracted by the extra traffic control as they clear the tracks.
5. There were 7 left turn collisions involving the westbound left and the eastbound through movement, with the changing traffic signal and traffic speeds cited as contributing factors. The eastbound drivers were often in the outside lane.

Table 11: Collision Types at Hwy 16 / Kenney Street

Crash Types	PDO	Injury	Total
Rear End	8	4	12
Left Turn	6	4	10
Rear End – Right Turn	1		1
Side Impact	1	2	3
Side Swipe Same Direction	2		2
Single Vehicle	2		2
Head On	1		1
Total	21	10	31

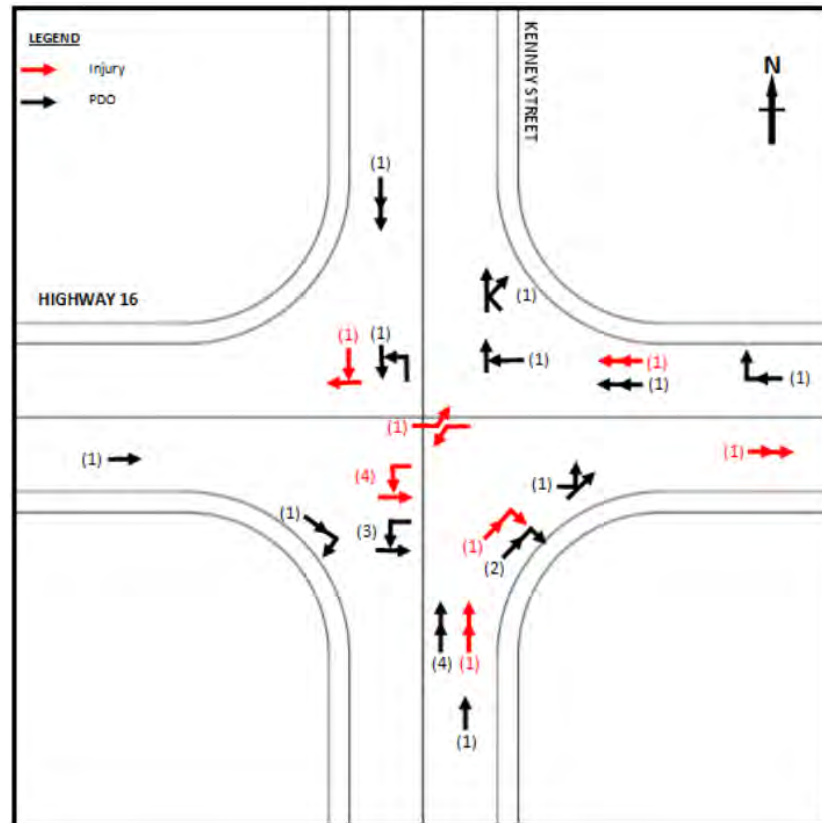


Figure 53: Collision Diagram at Highway 16 and Kenney Street

Potential Solutions:

The two collision trends with strong potential for correctability are the westbound left turns and the northbound rear ends, with the former tending to be the more severe. Potential improvements are as follows:

1. Install a red light camera for Highway 16 eastbound traffic to reduce the incidence of red light running, especially conflicting with westbound left turns.
2. Revisit the traffic control (i.e. traffic signal and rail signal) on the northbound approach to ensure clear and visible guidance.
3. Ensure the traffic signals meet current MoTI specifications for visibility.
4. Construct a dedicated left turn lane on the Kenney Street approaches to allow through traffic to proceed unimpeded across the highway.
5. Construct a new rail overpass at the Kalum Lake Road intersection to reduce the traffic demand at this at-grade crossing.

Any modifications at this intersection will require the participation of MoTI.

6.2.2 Keith Avenue at Kenney Street



Description:

The intersection of Keith Avenue at Kenney Street (Figure 54) has stop control on the eastbound and westbound approaches on Keith Avenue. The intersection is part of a major truck route through Terrace's industrial area, and connects directly to Highway 16 to the east and to the north. The estimated entering traffic volume is 8,200 vpd.

Both roads are two-lanes, with posted speeds of 50 km/h. A raised island on the northeast corner channelizes right turn traffic, and also provides protection for hydro pole with bi-directional power lines. The stakeholders identified the pole as an impediment to the sight distance at the intersection.

Figure 54: Keith Avenue at Kenney Street

Collision Analysis:

Within the recent five year study period, there were 19 reported incidents (i.e. 4 per year on average). The obvious trends in the collision data were as follows (Table 12 and Figure 55):

1. The majority of collisions (13) occurred during the daytime during typical work hours, between 10:30AM and 6:00PM, indicating no likely concern with illumination.
2. Almost half the collisions involved injuries, indicating a high degree of severity.
3. There were 11 incidents involving drivers not yielding right-of-way on Keith Avenue, resulting in 90 degree collisions.
4. Two incidents were caused by cyclists on Keith Avenue not stopping.
5. There was one pedestrian collision in the west crosswalk, by an eastbound driver.

Table 12: Collision Types at Keith Avenue / Kenney Street

Crash Types	PDO	Injury	Total
Rear End	4	1	5
Left Turn	1		1
Rear End – Right Turn			
Side Impact	2	9	11
Single Vehicle	1	1	2
Head On			
Total	8	11	19

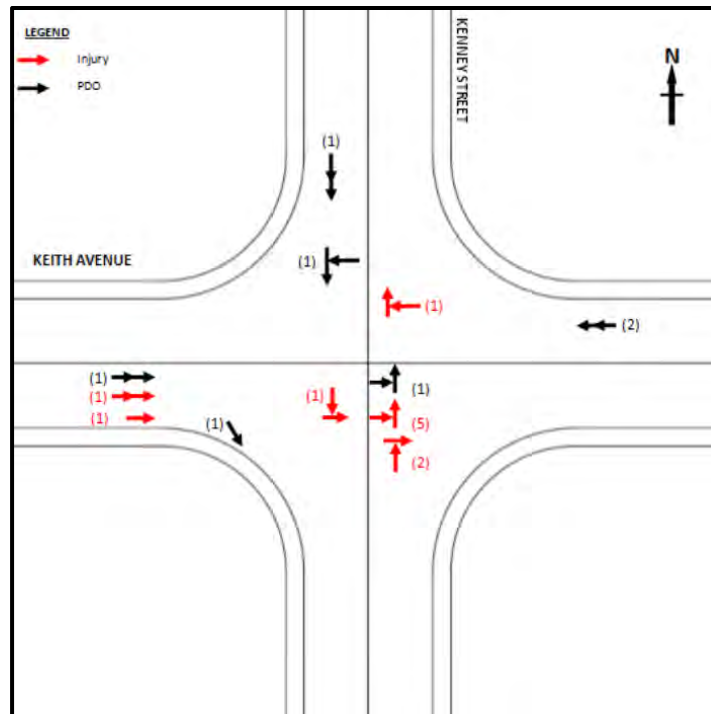


Figure 55: Collision Diagram at Keith Avenue and Kenney Street

Potential Solutions:

Both drivers and cyclists on Keith Avenue are not yielding right-of-way to traffic on Kenney Street. Furthermore, the visual cues suggest a continuing road on each approach, and Kenney Street is the only stop-controlled intersection on Keith Avenue. And finally, it is not always clear to drivers on Keith Avenue that Kenney Street traffic is free-flow. For these reasons, the highest potential for correctability appears to be with the traffic control. From Section 5.4, left turn lanes would also be beneficial from an operational perspective, but these would have a lesser effect on the identified collision trends than traffic control.

Applying the TAC warrants, a four-way stop appears warranted by the traffic volumes. The current Level of Service for the intersection is “B”, with the Keith Avenue approaches currently experiencing a Level of Service between “C” and “D” during the peak hours. By converting the intersection to a four-way stop, the Level of Service on all approaches would be between “A” and “B” during the peak hours.

By stopping all four approaches, the collisions should decrease due to the reduction in delays on Keith Avenue, and from the inherent reduction in traffic speeds through the intersection. To address the visual cues that suggest a continuous road, the stop signs should be complemented by red reflective post covers, and ideally a red flashing beacon on each approach (either under the stop signs, or suspended over the intersection).

After the four-way stop is installed, the volumes and queue lengths should be monitored to ensure southbound traffic does not queue back to the railway tracks. If and when this occurs, signalization (or a roundabout) should be considered for installation, with queue detection on the southbound approach.

6.2.3 Highway 16 (Keith Avenue) at Kalum Street



Description:

The signalized intersection of Highway 16 (Keith Avenue) at Kalum Street (Figure 56) connects highway traffic to the residential area to the south. One of the two local Tim Horton’s restaurants is situated on the southwest corner, which contributes to a significant volume of turning traffic at the intersection.

The highway has four lanes, with no turning lanes. The Kalum Street approaches have a shared left/through lane and a dedicated right turn lane. The estimated average daily entering traffic at the intersection is 17,000 vpd. The posted speed on both roads is 50 km/h.

Figure 56: Hwy 16 (Keith Ave) at Kalum Street

Collision Analysis:

Within the recent five year study period, there were 34 reported incidents (i.e. 7 per year on average). The obvious trends in the collision data were as follows (Table 13 and Figure 57):

1. There were 9 collisions that occurred on Fridays, with only a few on each of the other days.
2. The collisions were generally evenly distributed through the seasons.
3. The majority of collisions (27) occurred during the daytime, between 8:00AM and 8:00PM, indicating no likely concern with illumination. A large proportion of these (11) occurred between 3:00 PM and 6:00PM.
4. There were 12 rear end collisions, many of which involved an impact with a vehicle in the inside lane, stopped to make a left turn. The majority of the rear end collisions were in the eastbound and westbound directions.
5. There were 8 incidents attributed to westbound left turn movements colliding with opposing eastbound movements.
6. Two incidents involved pedestrians, one of which was crossing the highway.

Table 13: Collision Types at Hwy 16 / Kalum Street

Crash Types	PDO	Injury	Total
Rear End	6	6	12
Left Turn	6	4	10
Rear End – Right Turn			
Side Impact	1	1	2
Sideswipe – Same Direction	3		3
Single Vehicle	5	2	7
Head On			
Total	21	13	34

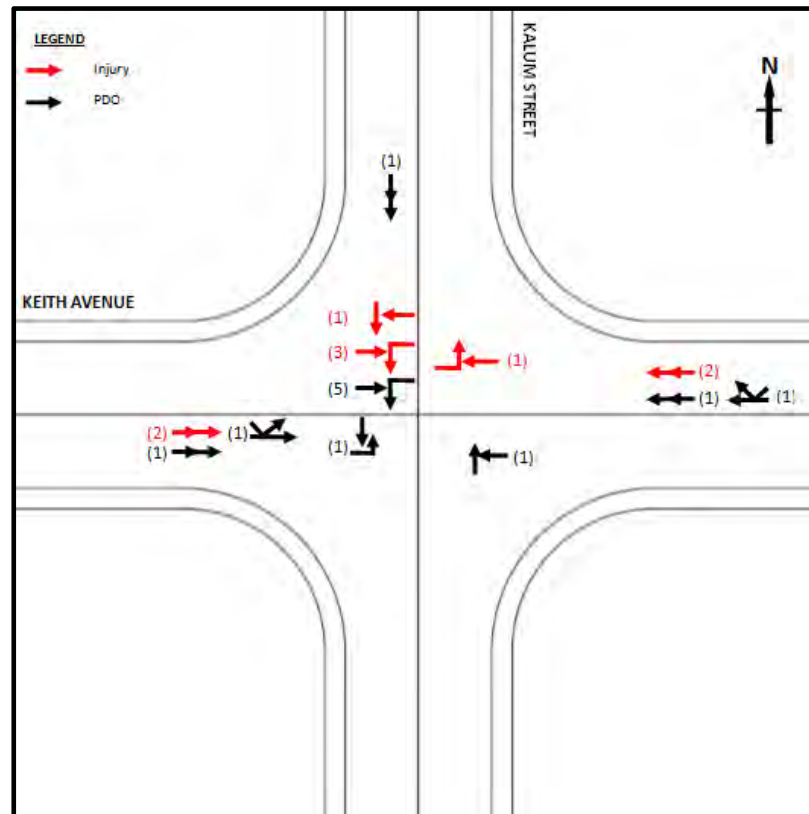


Figure 57: Collision Diagram at Highway 16 (Keith Ave) and Kalum Street

Potential Solutions:

The trend with a strong potential for correctability are associated with the left turn movements, especially in the westbound direction. A westbound advance left turn phase was added to the traffic signal in 2016, which helps address the turning demand. To further facilitate these turns and to reduce the potential for rear end collisions, dedicated left turn lanes should be considered. These would be costly in consideration of the adjacent infrastructure, the narrow right-of-way, and the large power poles on the north side of the highway. Therefore, this improvement should be planned, but will not likely be justifiable until the left turning volume increases significantly.

The trend in rear end collisions may have already been partially addressed by recent modifications in the adjacent restaurant drive-through, which have reduced queueing problems on the highway. Any remaining rear end issues can be addressed by ensuring that the traffic signals meet current MoTI specifications for visibility.

Any modifications at this intersection will require the participation of MoTI.

6.2.4 Lazelle Avenue at Kalum Street



Figure 58: Lazelle Avenue at Kalum Street

Description:

The intersection of Lazelle Avenue and Kalum Street in Downtown Terrace has a stop condition on the Lazelle Street approaches, and free flow traffic on Kalum Street between the signalized intersections at Lakelse Avenue and Park Avenue (Figure 58).

Kalum Street is four lanes at the Lazelle intersection, but changes to two-lanes with a Two-Way Left Turn Lane north of Park Avenue. Lazelle Avenue is a two lane road. Both roads are posted at 50 km/h. The estimated average daily entering traffic volume is 9,600 vpd.

Collision Analysis:

Within the recent five year study period, there were 16 reported incidents (i.e. 3 per year on average). The obvious trends in the collision data were as follows (Table 14 and Figure 59):

1. There were 7 collisions that occurred in winter months (i.e. November to February), indicating a potential issue with winter road conditions.
2. Almost all collisions occurred between the late morning and early evening hours (i.e. 11AM to 6PM), when activity Downtown is greatest. Ten of these were between 2PM and 4:30PM.
3. There were 5 incidents that involved 90 degree collisions; these were evenly distributed by direction. With the proximity of the adjacent buildings and the four lanes of traffic, this likely indicates an issue with sight distance.
4. There were 5 rear-end collisions, most of which occurred on Lazelle Avenue at the stop condition.

Table 14: Collision Types at Lazelle Ave / Kalum St

Crash Types	PDO	Injury	Total
Rear End	3	2	5
Left Turn		1	1
Rear End – Right Turn			
Side Impact	2	3	5
Sideswipe – Same Direction	3		3
Single Vehicle	1		1
Unknown			1
Total	10	6	16

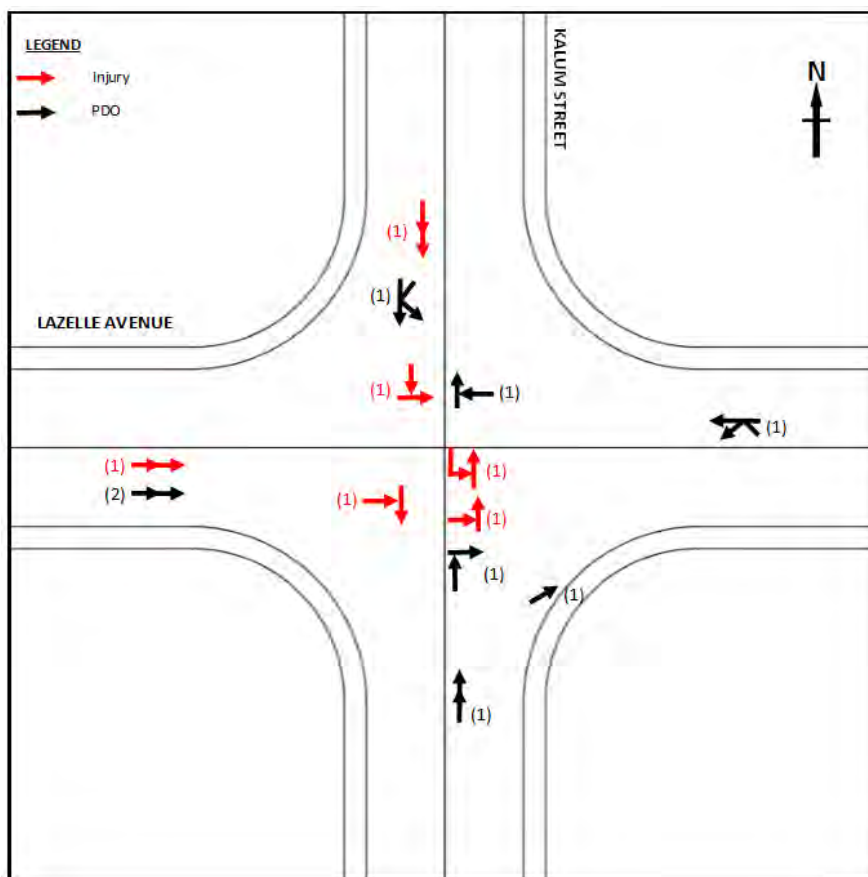


Figure 59: Collision Diagram at Lazelle Avenue at Kalum Street

Potential Solutions:

The two trends with the most potential for correctability are the rear ends and the 90 degree collisions:

1. The 90 degree collisions can be addressed by continuing the lane diet south of Park Avenue, through the Lazelle Avenue intersection. With only two lanes of through traffic on Kalum Street, drivers on Lazelle Avenue can better gauge safe gaps in traffic flow. Furthermore, there are less conflict points when crossing the intersection.
2. The rear end collisions can also be addressed by extending the lane diet on Kalum Street. On Lazelle Avenue, drivers can move further into the intersection to see oncoming traffic more clearly, which may reduce the need for reversing manoeuvres that cause rear ends. On Kalum Street itself, a dedicated left turn lane will also reduce the potential for rear end collisions by separating the turning movements from the through movements.
3. Rear end collisions can also be reduced on Lazelle Avenue by installing a sidewalk extension on the northeast corner of the intersection. This will allow the westbound stop sign to be placed in a more visible location for approaching traffic.

6.2.5 Park Avenue at Kalum Street

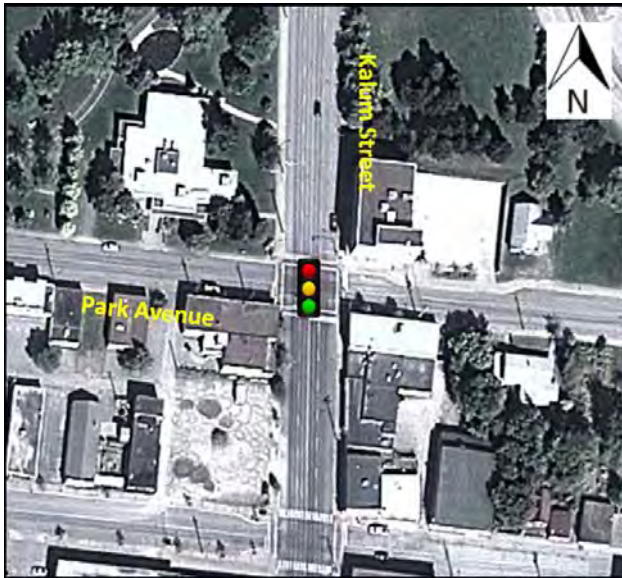


Figure 60: Park Avenue at Kalum Street

Description:

The intersection of Park Avenue and Kalum Street in Downtown Terrace (Figure 60) is controlled by a traffic signal. Kalum Street had a four-lane cross section during the study period, but has since been changed to two lanes with a Two-Way Left Turn Lane north of Park Avenue.

Park Avenue is two lanes at the Kalum Street intersection, with an 11 metre long right turn lane on the westbound approach. Adjacent buildings reduce the available sight distances around the intersection corners. Both roads are posted at 50 km/h. The estimated average daily entering traffic volume is 9,600 vpd.

Collision Analysis:

Within the recent five year study period, there were 21 reported incidents (i.e. 4 per year on average). The obvious trends in the collision data were as follows (Table 15 and Figure 61):

1. There were 9 collisions that occurred in winter months (i.e. November to February), indicating a potential issue with winter road conditions.
2. The majority of collisions occurred between the late morning and early evening (i.e. 11AM to 6PM), when activity Downtown is greatest. Seven of these occurred between 3:00PM and 6:00PM. Illumination is not considered a factor.
3. Only five collisions involved injuries, indicating lower speed collisions.
4. Two incidents cited winter conditions as a factor.
5. Three incidents were reported as rear ends, including reversing manoeuvres.
6. Seven incidents were reported as 90 degree collisions due to red light running.
7. Three incidents involved left turn manoeuvres on Kalum Street.
8. Two collisions involved pedestrians, one of which was identified as jaywalking.

Table 15: Collision Types at Park Ave / Kalum St

Crash Types	PDO	Injury	Total
Rear End	3		3
Left Turn	3	1	4
Rear End – Right Turn			
Side Impact	5	2	7
Sideswipe – Same Direction	1		1
Sideswipe – Opposite Direction	2		2
Single Vehicle	2	2	4
Head On			
Total	16	5	21

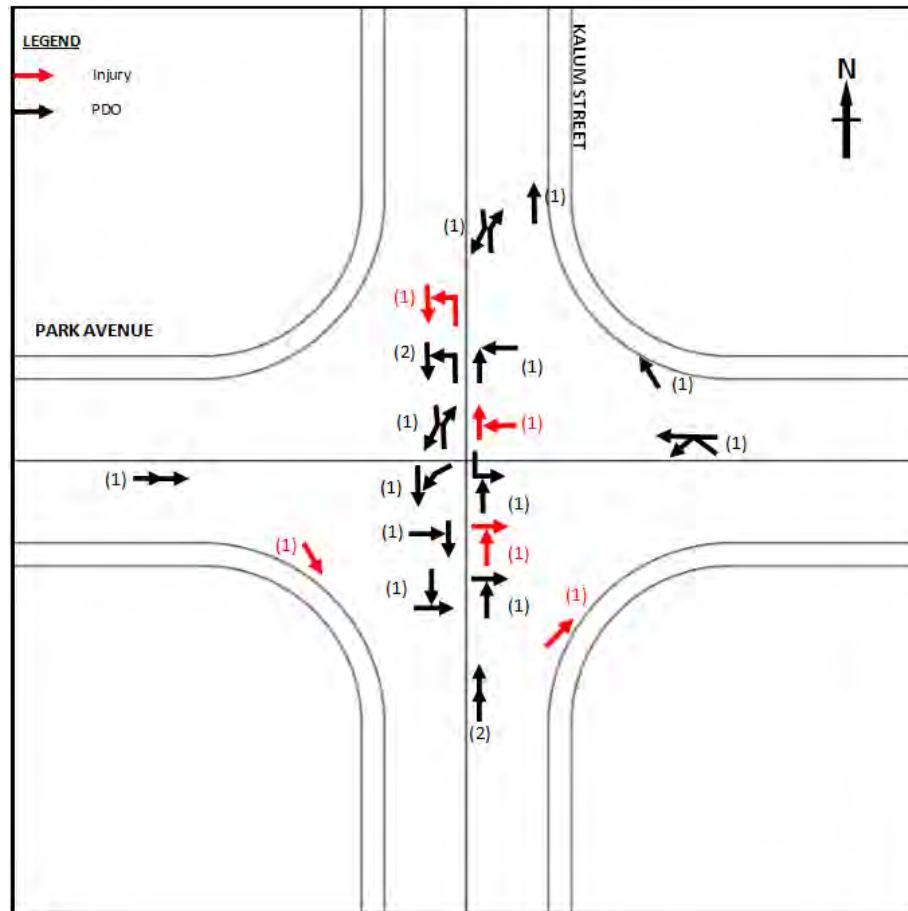


Figure 61: Collision Diagram at Park Avenue at Kalum Street

Potential Solutions:

The collision trend associated with the left turn manoeuvres on Kalum Street could be addressed by creating formal northbound and southbound left turn lanes, which could be achieved by extending the existing three lane section on Kalum Street south through the Downtown. This would improve the sight distance for left turn movements, and eliminate the conflict from the second opposing lane of traffic.

The trend in 90 degree collisions due to red light running has a strong potential for correctability. This can be addressed by:

1. Revisiting the intergreen (i.e. yellow-red) phase of the signal timing. In particular, 2 seconds of “all-red” time after each phase can significantly improve the safety of the vehicle clearance.
2. Upgrading the signal heads to higher intensity LED bulbs.
3. Upgrading the primary head backboards to reflective yellow sheeting.

Although the trend in pedestrian collisions is relatively small, the incidence of jay walking and general pedestrian crossing safety can be improved with the installation of countdown pedestrian signal heads.

6.2.6 Scott Avenue at Eby Street



Description:

Situated in the residential neighbourhood at the bottom of the Bench, the intersection of Scott Avenue and Eby Street is effectively the connection of two city collectors (Figure 62). Both roads are two lanes, and there are no turning lanes at the intersection.

The eastbound and westbound approaches on Scott Avenue have stop conditions. Eby Street is free-flowing through the intersection. The daily traffic volume entering the intersection is estimated at 3,500 vpd. The posted speed on all approaches is 50 km/h. This is the only city intersection that had a fatal collision during the study period.

Figure 62: Scott Avenue at Eby Street

Collision Analysis:

Within the recent five year study period, there were 4 reported incidents (i.e. less than one per year). It is the low volume of traffic and the high severity of the collisions that has caused this intersection to be in the Top 20 list. The obvious trends in the collision data were as follows (Table 16 and Figure 63):

1. All collisions occurred in the afternoon or early evening, during daylight hours. This does not indicate any concerns with illumination.
2. One collision was a rear end with a vehicle that had stopped to make a left turn.
3. Two of the incidents were 90 degree collisions caused by drivers on Scott Avenue not yielding right-of-way. One involved running through the stop sign, and one involved stopping, then proceeding without a safe gap in traffic.
4. The fatal collision involved a northbound vehicle turning left in front of a southbound vehicle.

Table 16: Collision Types at Scott Ave / Eby St

Crash Types	PDO	Injury	Fatality	Total
Rear End	1			1
Left Turn			1	1
Rear End – Right Turn				
Side Impact	1	1		2
Sideswipe – Same Direction				
Sideswipe – Opposite Direction				
Single Vehicle				
Head On				
Total	2	1	1	4

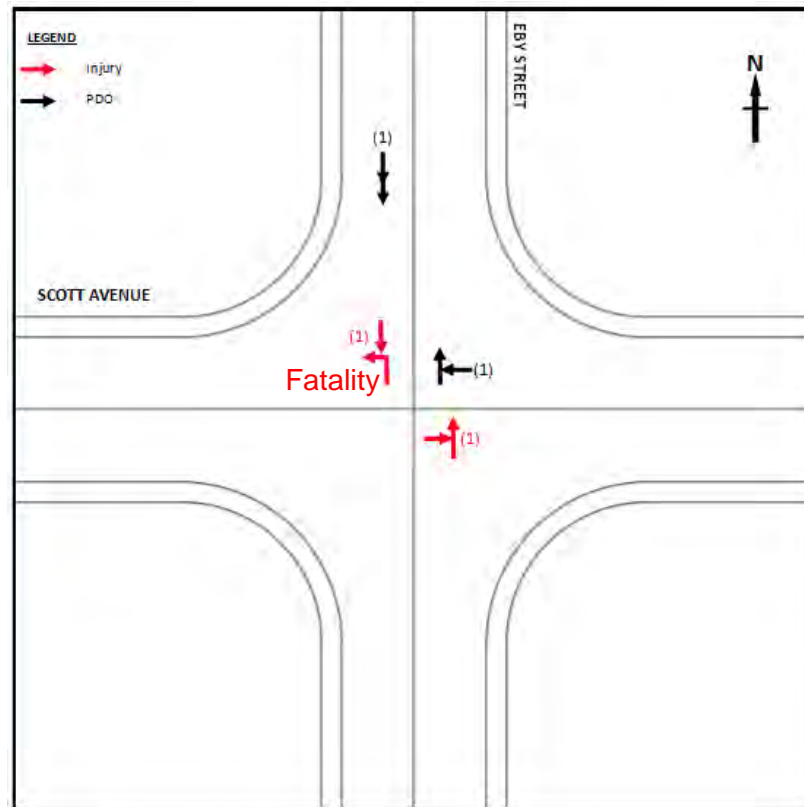


Figure 63: Collision Diagram at Scott Avenue at Eby Street

Potential Solutions:

The trend with the strongest potential for correctability is with drivers on Scott Avenue failing to yield right-of-way. This may be addressed by the following:

1. The visibility of the stop signs on Scott Avenue should be improved by adding red reflective tape to the stop sign posts.
2. The westbound stop sign should be relocated closer to the roadway.
3. A stop line should be painted on the westbound approach, similar to the eastbound approach.
4. Ensure snow piles are kept sufficiently back from the intersection to preserve the necessary sight lines.

The fatal collision did not appear to follow any defined trends at the intersection. However, to help protect against a similar incident in the future, the left turn conflicts at this intersection (and similar intersections) should be monitored to determine if effective counter-measures can be identified.

6.2.7 Highway 16 at Munroe Street



Figure 64: Hwy 16 at Munroe Street

Description:

The T-intersection of Highway 16 and Munroe Street connects a main city collector to the provincial highway (Figure 64). The highway has four lanes of free flow traffic through the intersection; Munro Street is two-lanes, with a stop condition at the highway. There are no turning lanes on any of the approaches.

Both roads are posted at 50 km/h. The estimated average daily entering traffic volume is 9,800 vpd. The intersection is located 400 metres west of the signalized intersection at Eby Street, and 400 metres east of the signalized intersection at Kenney Street. Both signals provide gaps in traffic that facilitate turning movements.

Collision Analysis:

Within the recent five year study period, there were 14 reported incidents (i.e. 3 per year on average). The obvious trends in the collision data were as follows (Table 17 and Figure 65):

1. All collisions occurred between the hours of 8:00 AM and 5:30 PM, which were almost all during daylight hours. This does not indicate concerns with illumination.
2. Eight of the collisions occurred between Friday and Saturday.
3. Only three collisions involved injuries, indicating lower severity incidents.
4. Half of the incidents involved southbound drivers on Munroe Street attempting to turn left, and colliding with a westbound vehicle on Highway 16.

Table 17: Collision Types at Hwy 16 / Munroe Street

Crash Types	PDO	Injury	Total
Rear End	4		4
Left Turn	6	3	9
Rear End – Right Turn			
Side Impact	1		1
Sideswipe – Same Direction			
Sideswipe – Opposite Direction			
Single Vehicle			
Head On			
Total	11	3	14

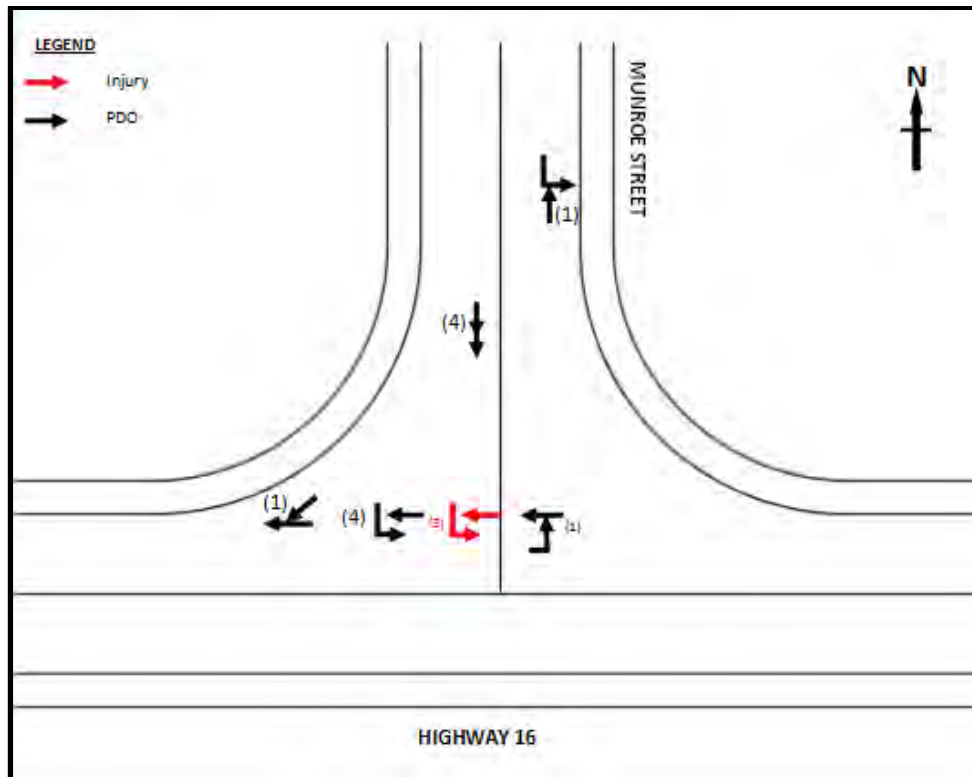


Figure 65: Collision Diagram at Highway 16 at Munroe Street

Potential Solutions:

The trend with the most potential for correctability is associated with the southbound left turn movements. These appear to be problematic due to drivers misjudging the gaps, especially over four lanes of highway traffic. The easiest solution would be to ensure the sight lines at the intersection are maintained, especially looking east from Munroe Street. The northeast corner of the intersection should thus be kept clear of parked vehicles, signage, foliage, and piles of snow in the winter months.

Although there does not appear to be a problem with drivers observing the stop sign on Munroe Street, the stop condition at the highway does warrant a stop line. The stop sign itself could also be emphasized with reflective tape on the sign post.

The collision trend could also be addressed by restricting the intersection movements to right-in/right-out only (e.g. with the installation of a raised island). Lazelle Avenue to the north would allow traffic on Munroe Street to easily divert to the traffic signals at Eby Street and Kenney Street. However, unless this improvement is implemented in conjunction with access management along Highway 16, southbound drivers on Munroe Street would be inclined to divert through the adjacent properties to connect to Highway 16.

Any modifications at this intersection will require the participation of MoTI.

6.2.8 Lakelse Avenue at Kalum Street



Description:

The signalized intersection of Lakelse Avenue and Kalum Street is situated in the middle of Downtown Terrace (Figure 66). Kalum Street is four lanes, and is classified as an arterial road due to its direct connection to the Upper Bench. The west leg of Lakelse Avenue is two-lanes through the street-scaped Downtown neighbourhood. The east leg of Lakelse Avenue is four lanes, and connects to the Skeena River Bridge. An advance protected left turn phase facilitates eastbound left turning traffic from Lakelse Avenue to Kalum Street.

Both roads are posted at 50 km/h. The estimated average daily entering traffic volume is 11,000 vpd.

Figure 66: Lakelse Avenue at Kalum Street

Collision Analysis:

Within the recent five year study period, there were 18 reported incidents (i.e. almost 4 per year on average). The obvious trends in the collision data were as follows (Table 18 and Figure 67):

1. There were 9 collisions that occurred in winter months (i.e. November to February), indicating a potential issue with winter road conditions.
2. There were 16 collisions that occurred between the hours of 10:00 AM and 6:00 PM, when activity Downtown is greatest. Illumination is not likely to be a concern.
3. Only four of the collisions involved injuries, reflecting the lower speeds of the collisions.
4. Ten of the incidents were rear-end collisions.
5. Five of the incidents were classified as sideswipes.

Table 18: Collision Types at Lakelse Ave / Kalum St

Crash Types	PDO	Injury	Total
Rear End	5	3	8
Left Turn			
Rear End – Right Turn	2		2
Side Impact	1	1	2
Sideswipe – Same Direction	5		5
Sideswipe – Opposite Direction			
Single Vehicle	1		1
Head On			
Total	14	4	18

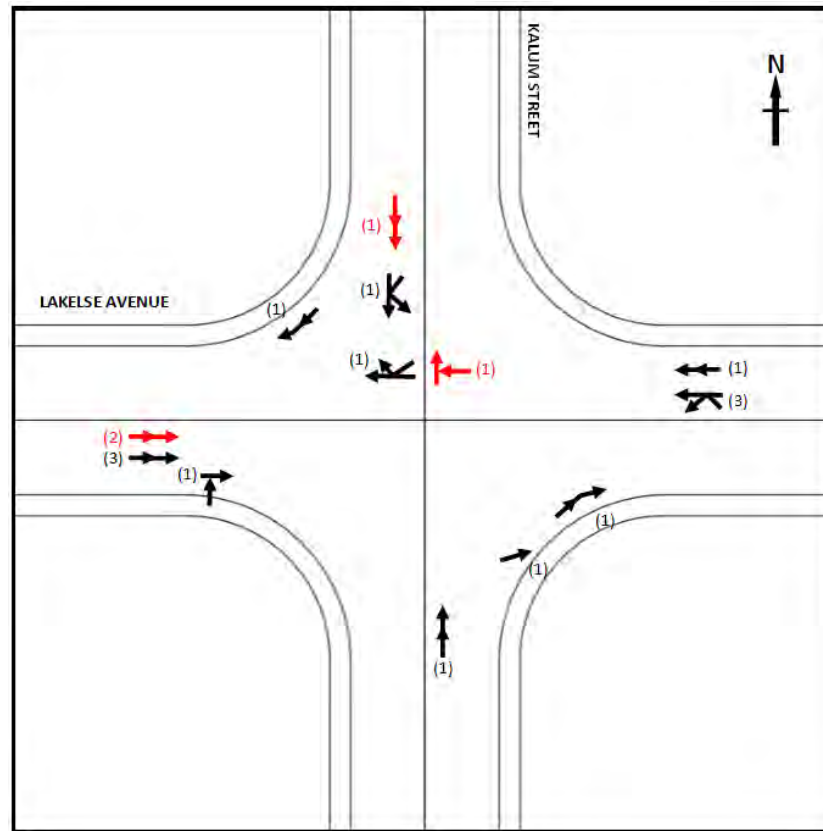


Figure 67: Collision Diagram at Lakelse Avenue at Kalum Street

Potential Solutions:

The trend with the most potential for correctability is associated with the rear ends, which were present on all four approaches. Some drivers mentioned they were unable to see the signals clearly. To improve the visibility of the traffic signals, the heads should be changed to higher intensity LED bulbs, and the backboards on the primary heads upgraded to a reflective material.

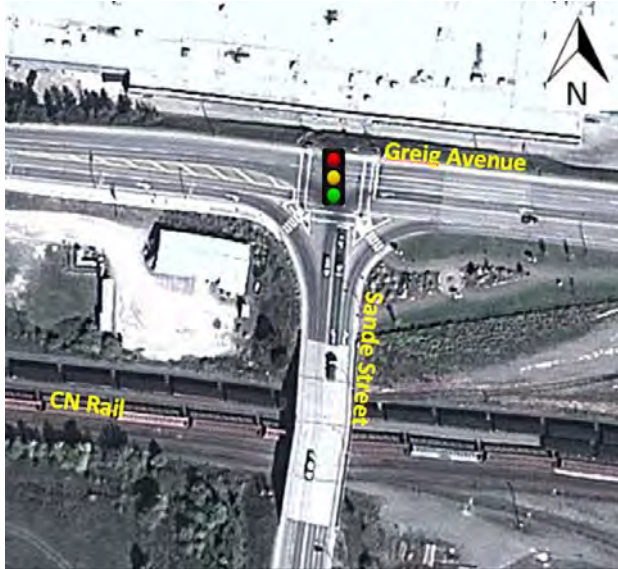
The rear end collisions on Kalum Street could also be addressed by extending the lane diet at Park Avenue through the Lakelse Avenue intersection. By having opposing left turn lanes on the north and southbound approaches, the left turning traffic could be separated from the conflict with through traffic.

The trend in sideswipes could be addressed with a lane diet on Kalum Street by improving the clarity and guidance of the laning. This should reduce the potential for drivers to change lanes through the intersection.

A lane diet would also be beneficial on the east leg of Lakelse Avenue. However, the laning at Kalum Street would have to be adjusted to match the two lane section on the west side of the intersection. Otherwise, another trend in sideswipes could arise.

Snow and ice removal should be maintained through the winter months, especially to reduce the potential for rear end collisions at this and other signalized intersections.

6.2.9 Highway 16 at Sande Street / Greig Avenue



Description:

The signalized intersection of Sande Street and Greig Avenue connects Highway 16 to the city’s arterial network (Figure 68). The south leg of the intersection (Sande Street) is the only grade-separated crossing of the CN rail line within Terrace. The west leg of the intersection continues west to Prince Rupert. The east leg of the intersection is a city arterial road connecting into the Downtown.

All roads are four-lanes, although there is only one dedicated lane in each direction for highway through traffic (i.e. eastbound right turns and northbound left turns). The estimated daily entering traffic volume is 18,300 vpd. All approaches are posted at 50 km/h.

Figure 68: Hwy 16 at Sande St / Greig Ave

Collision Analysis:

Within the recent five year study period, there were 23 reported incidents (i.e. 5 per year on average). The obvious trends in the collision data were as follows (Table 19 and Figure 69):

1. There were 12 collisions that occurred in winter months (i.e. November to February), indicating a potential issue with winter road conditions.
2. There were 17 collisions that occurred during work hours (i.e. 10AM to 6PM). Seven of these were between 4:00PM and 6:00PM, the PM Peak. Illumination is not likely a concern.
3. There were 10 incidents that involved rear end collisions. These were most prevalent on the northbound (Sande Street) approach.
4. There were 12 incidents involving left turning movements. These were most prevalent between the westbound left and the eastbound through traffic.

Table 19: Collision Types at Hwy 16 / Sande St / Greig Ave

Crash Types	PDO	Injury	Total
Rear End	7	3	10
Left Turn	6	6	12
Rear End – Right Turn			
Side Impact			
Sideswipe – Same Direction	1		1
Sideswipe – Opposite Direction			
Single Vehicle			
Head On			
Total	14	9	23

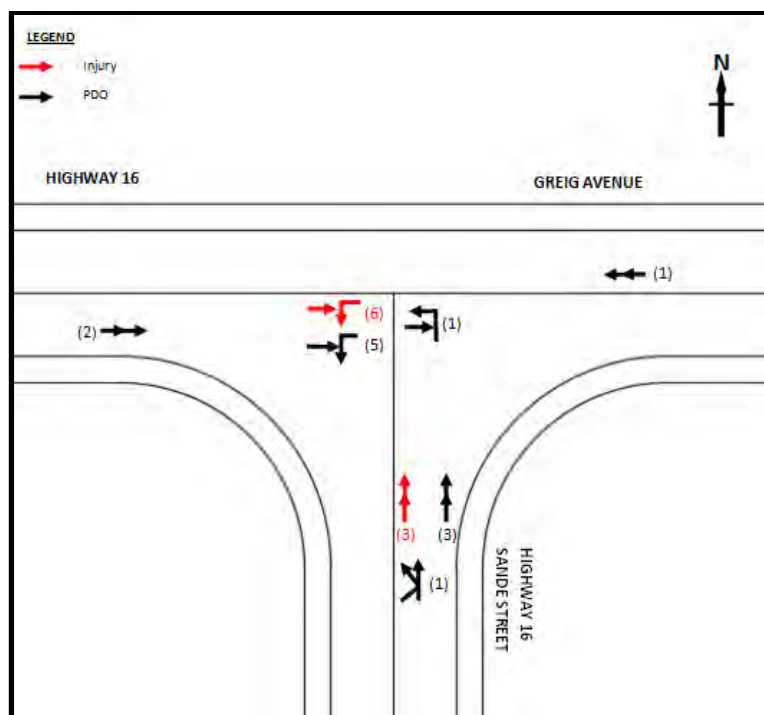


Figure 69: Collision Diagram at Hwy 16 / Sande St / Greig Ave

Potential Solutions:

The two collision trends with the strongest potential for correctability are the northbound rear end collisions, and the westbound left turn collisions.

The northbound rear ends were attributed to such factors as:

1. Icy road conditions, especially on the downgrade to the signal. This can be addressed with extra sanding and salting by MoTI during winter maintenance activities.
2. Stopping for pedestrians crossing the intersection, which can be addressed with the installation of crosswalk signs between the southeast corner of the intersection and the corner island.
3. Traffic congestion during peak hours, which can be addressed with a second northbound left turn lane. This would be a costly improvement due to the proximity of the bridge, but may be warranted by the anticipated traffic volumes by 2025.
4. The visibility of the traffic signals, which can be addressed by ensuring the signal heads meet current MoTI specifications for visibility.

The trend in collisions between westbound left turns and eastbound through traffic could be addressed by converting the westbound advance left turn (“protected-permitted”) phase to protected-only left turns. However, this would add a significant delay to the intersection. Another solution may be to construct a median island on the eastbound approach to help westbound drivers recognize opposing through traffic approaching over the crest of the intersection.

Any modifications at this intersection will require the participation of MoTI.

6.2.10 Haugland Avenue at Kalum Street



Description:

The intersection of Haugland Avenue and Kalum Street is located on the south side of Terrace. Both roads are two lane collectors with no designated turning lanes. South Kalum Street has right-of-way. The eastbound and westbound approaches on Haugland Avenue have stop conditions (Figure 70).

Both roads are posted at 50 km/h. The estimated daily entering traffic volume is 4,000 vpd.

Figure 70: Haugland Avenue at S. Kalum Street

Collision Analysis:

Within the recent five year study period, there were 5 reported incidents (i.e. 1 per year on average). The low estimated traffic volume and the relatively high collision severity (4/5 injury collisions) caused this intersection to be identified on the Top 20 list.

The obvious trends in the collision data were as follows (Table 20 and Figure 71):

1. All collisions occurred during the daytime, between 8:30 AM and 5:00PM. Illumination is not likely to be a concern.
2. Two collisions were attributed to winter conditions.
3. Four of the collisions were attributed to drivers on Haugland Avenue not yielding to traffic on Kalum Street.

Table 20: Collision Types at Haugland Ave / S Kalum St

Crash Types	PDO	Injury	Total
Rear End	1		1
Left Turn		1	1
Rear End – Right Turn			
Side Impact		2	2
Sideswipe – Same Direction			
Sideswipe – Opposite Direction			
Single Vehicle			
Head On		1	1
Total	1	4	5

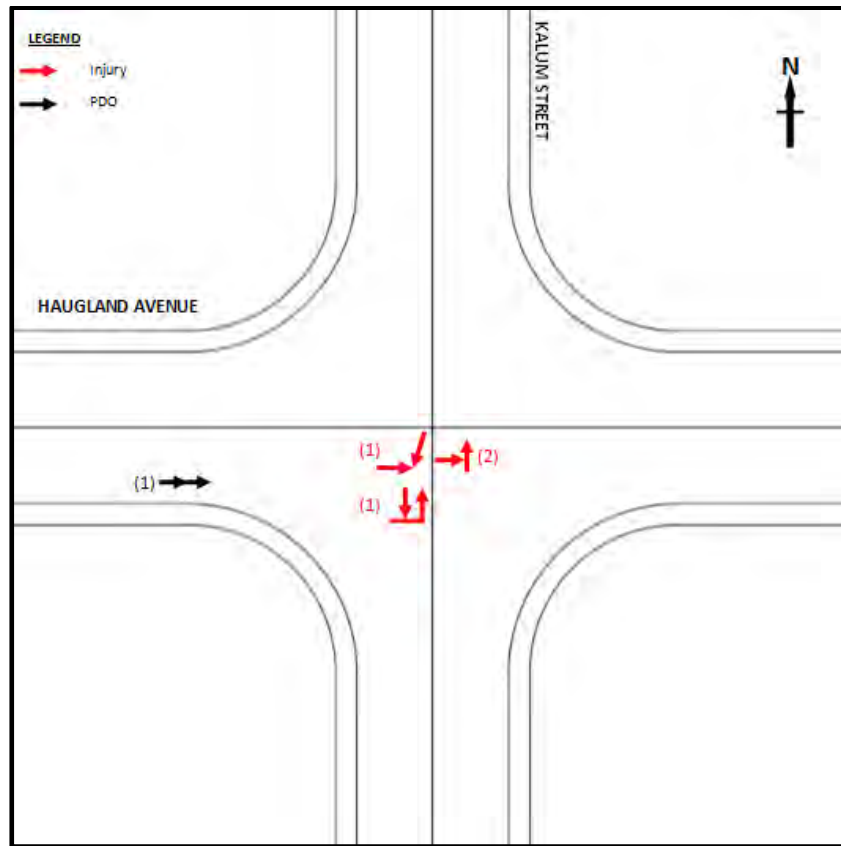


Figure 71: Collision Diagram at Haugland Avenue at S. Kalum Street

Potential Solutions:

The trend with the strongest potential for correctability is with drivers on Haugland Avenue failing to yield right-of-way. This may be addressed by the following:

1. The stop signs on Haugland Avenue should be located well within the drivers' lines of sight on both approaches. The stop signs should be made of micro-prismatic reflective sheeting, and complemented with reflective tape on the sign posts.
2. Stop lines should be painted on Haugland Avenue.
3. The sight lines in the intersection corners should be kept clear of foliage, snow piles, and other obstructions.

To address the trend in winter-related collisions, snow and ice removal activities should be maintained.

6.2.11 Hwy 16 (Keith Ave) at Hall Street



Description:

The intersection of Highway 16 (Keith Avenue) and Hall Street has a pedestrian signal, but not a traffic signal. Highway 16 is a four lane provincial highway, with no turning lanes through the intersection. Hall Street is a two-lane local road that connects to the south side of Terrace (Figure 72).

Both roads are posted at 50 km/h. The estimated average daily entering traffic volume is 15,800 vpd, of which very little comes from Hall Street.

Figure 72: Hwy 16 (Keith Ave) at Hall Street

Collision Analysis:

Within the recent five year study period, there were 13 reported incidents (i.e. 3 per year on average). The obvious trends in the collision data were as follows (Table 21 and Figure 73):

1. Almost half the collisions involved injuries.
2. Almost all collisions occurred during work hours (i.e. 9:30AM to 5:00PM). Seven of these occurred between 2:00PM and 5:00PM.
3. Seven of the incidents involved rear ends, most of which were on Keith Avenue. These were attributed to such contributing factors as driver distraction, unexpected left turn movements, icy road conditions, and stopping for the pedestrian signal.
4. There were four sideswipe collisions, most of which involved drivers changing lanes at or near the intersection.

Table 21: Collision Types at Hwy 16 (Keith Ave) at Hall Street

Crash Types	PDO	Injury	Total
Rear End	4	3	7
Left Turn	1		1
Rear End – Right Turn			
Side Impact		1	1
Sideswipe – Same Direction	2	1	3
Sideswipe – Opposite Direction			
Single Vehicle			
Head On		1	1
Total	7	6	13

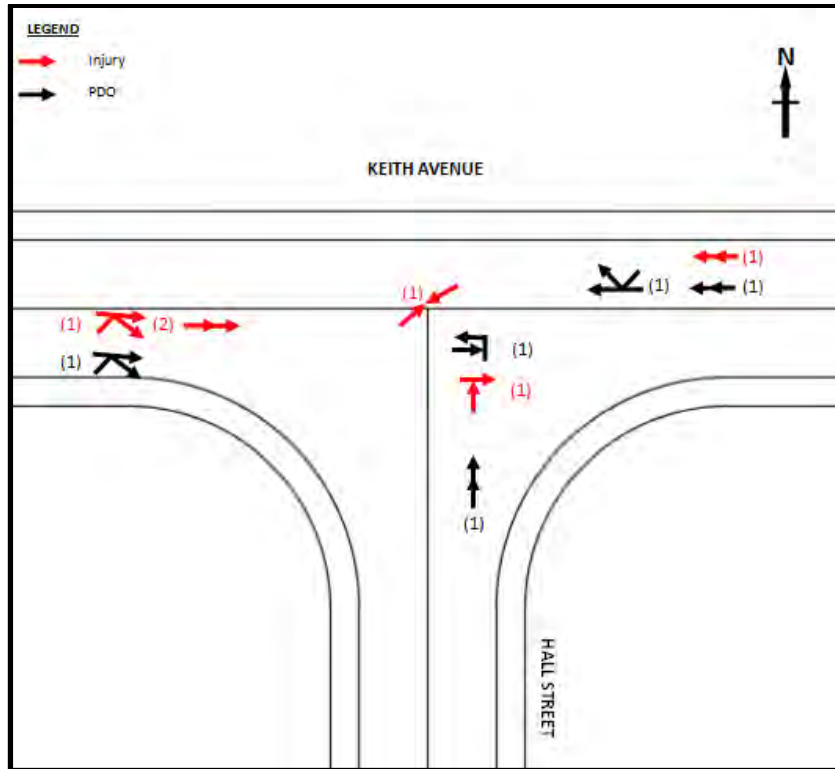


Figure 73: Collision Diagram at Hwy 16 (Keith Ave) at Hall Street

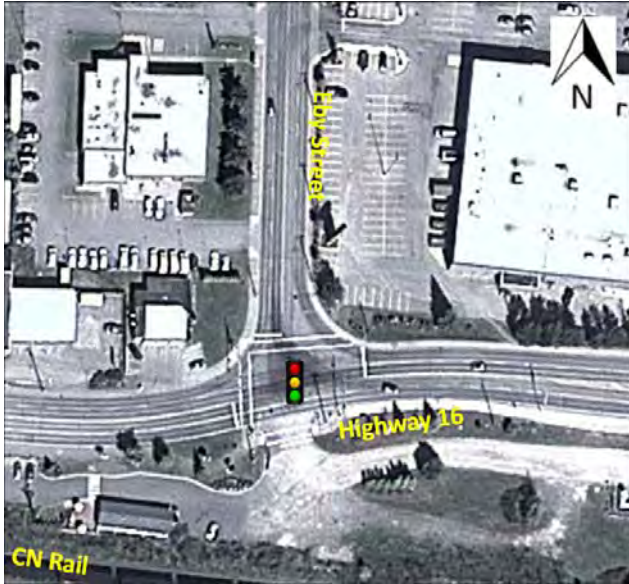
Potential Solutions:

The trend with the strongest potential for correctability is associated with the rear end collisions on Highway 16 (Keith Avenue). This trend can be addressed by ensuring the signal heads meet current MoTI specifications for visibility, and by maintaining winter maintenance operations as required. Turning lanes would also help reduce the potential for rear end collisions, although the existing right-of-way width is insufficient for the necessary highway widening.

The trend in sideswipe collisions on Highway 16 (Keith Avenue) could be addressed by painting a solid white line between the two through lanes on each intersection approach in order to reduce lane changing manoeuvres at the intersection.

Any modifications at this intersection will require the participation of MoTI.

6.2.12 Hwy 16 at Eby Street



Description:

The signalized intersection of Highway 16 and Eby Street is one of the primary connections between the provincial highway system and Downtown Terrace (Figure 74). The intersection is also located immediately west of the Sande Street overpass at Greig Avenue. The south leg of the intersection is an access, and has a low volume of traffic.

Both Highway 16 and Eby Street are four-lanes at the intersection, with no additional turning lanes. However, the right lane on Eby Street is for right turning traffic, and the left lane is for left turning traffic. The estimated average daily entering traffic volume is 13,600 vpd. Both roads are posted at 50 km/h.

Figure 74: Hwy 16 at Eby Street

Collision Analysis:

Within the recent five year study period, there were 15 reported incidents (i.e. 3 per year on average). The obvious trends in the collision data were as follows (Table 22 and Figure 75):

1. Six of the collisions involved injuries, potentially reflecting higher speeds.
2. Five collisions occurred during the winter months (i.e. November to January), which may indicate a potential concern with road conditions.
3. Almost all collisions occurred during work hours (i.e. 10AM to 6PM). Eight of these were between 4:00PM and 5:30PM, indicating a trend during the PM Peak Hour.
4. There were eight rear end collisions, occurring on all approaches.
5. Four of the collisions were sideswipes, most of which involved lane changing.
6. There were three incidents involving eastbound left turning vehicles colliding with westbound through vehicles.

Table 22: Collision Types at Hwy 16 at Eby Street

Crash Types	PDO	Injury	Total
Rear End	4	4	8
Left Turn	1	2	3
Rear End – Right Turn			
Side Impact			
Sideswipe – Same Direction	4		4
Sideswipe – Opposite Direction			
Single Vehicle			
Head On			
Total	9	6	15

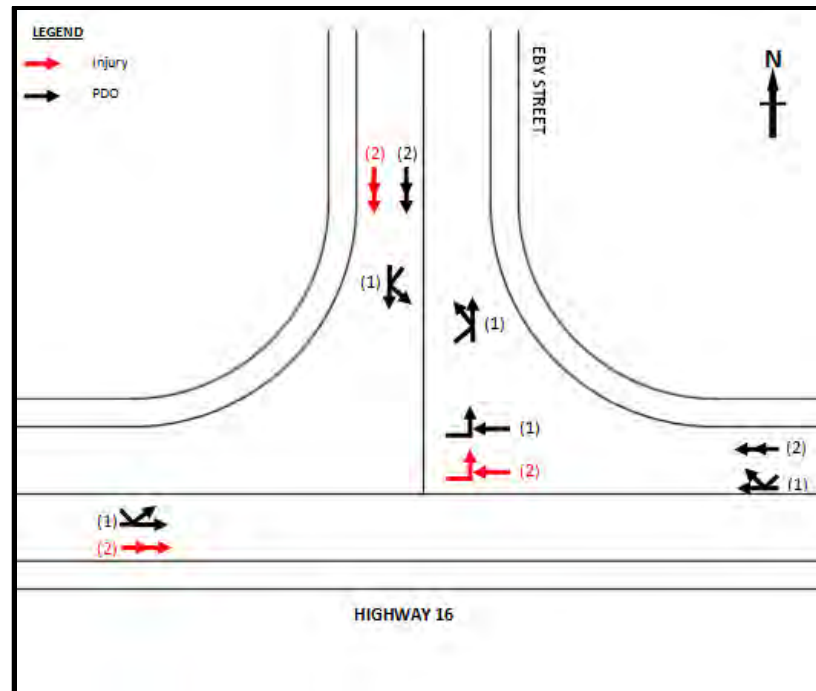


Figure 75: Collision Diagram at Hwy 16 at Eby Street

Potential Solutions:

The trend with the strongest potential for correctability is associated with the rear end collisions. This trend can be addressed by ensuring the signal heads meet current MoTI specifications for visibility, and by maintaining winter maintenance operations as required.

The installation of an eastbound left turn lane would be a relatively costly improvement, but would also reduce the potential for rear ends on the eastbound approach by separating the left turn movements. This left turn lane could also improve the left turning sight distance, which may also address the trend with left turn collisions. A left turn lane will likely be warranted in the future with the expected growth in traffic volumes.

The trend in sideswipes on Highway 16 could be addressed by painting solid white lines on the intersection approaches to restrict lane changes at the intersection.

A representative from the adjacent ambulance service identified a safety concern with the speed of southbound right turning traffic from Eby Street. These right turns conflict with vehicles entering Highway 16 from the ambulance service parking lot, especially in an emergency situation. This issue can be addressed by adding an emergency all-red pre-emption phase to the traffic signal. Since right turns are legal at red lights, the southbound right turns would require an additional red flashing beacon mounted to a sign that reads “No Right Turn when Red Light Flashing”.

During non-emergency situations, the safety of the ambulance parking lot access can be improved by removing the parking from the east end of the parking lot in order to clear the sight lines.

Any modifications at this intersection will require the participation of MoTI.

6.2.13 Walsh Avenue at Eby Street



Description:

The intersection of Eby Street and Walsh Avenue is centrally located in Terrace. Eby Street is a collector which connects to Highway 16 and the Downtown. Walsh Street is classified as a local road, but is also the main access route to Skeena Middle School to the west. There are stop conditions on the Walsh Avenue approaches, with free flow traffic movement on Eby Street (Figure 76).

Both roads are two lanes through the intersection, with no turning lanes. The estimated average daily entering traffic volume is 4,500 vpd. The posted speed on both roads is 50 km/h.

Figure 76: Walsh Ave at Eby Street

Collision Analysis:

Within the recent five year study period, there were 4 reported incidents (i.e. 1 per year on average). The collisions were evenly distributed throughout the days of the week, and the four seasons. The obvious trends in the collision data were as follows (Table 24 and Figure 77):

1. Three of the four incidents occurred in 2009, which may suggest any intersection improvements or changes in traffic patterns may have addressed an issue.
2. Two incidents were in the early evening, during hours of darkness.
3. All four collisions involved injuries, potentially indicating higher speeds.
4. Three of the incidents were caused by westbound drivers on Walsh Avenue failing to observe the stop sign, and colliding with through traffic on Eby Street.
5. One incident involved a pedestrian being struck as she crossed the street.

Table 23: Collision Types at Walsh Ave at Eby Street

Crash Types	PDO	Injury	Total
Rear End			
Left Turn			
Rear End – Right Turn			
Side Impact		3	3
Sideswipe – Same Direction			
Sideswipe – Opposite Direction			
Single Vehicle		1	1
Head On			
Total	0	4	4

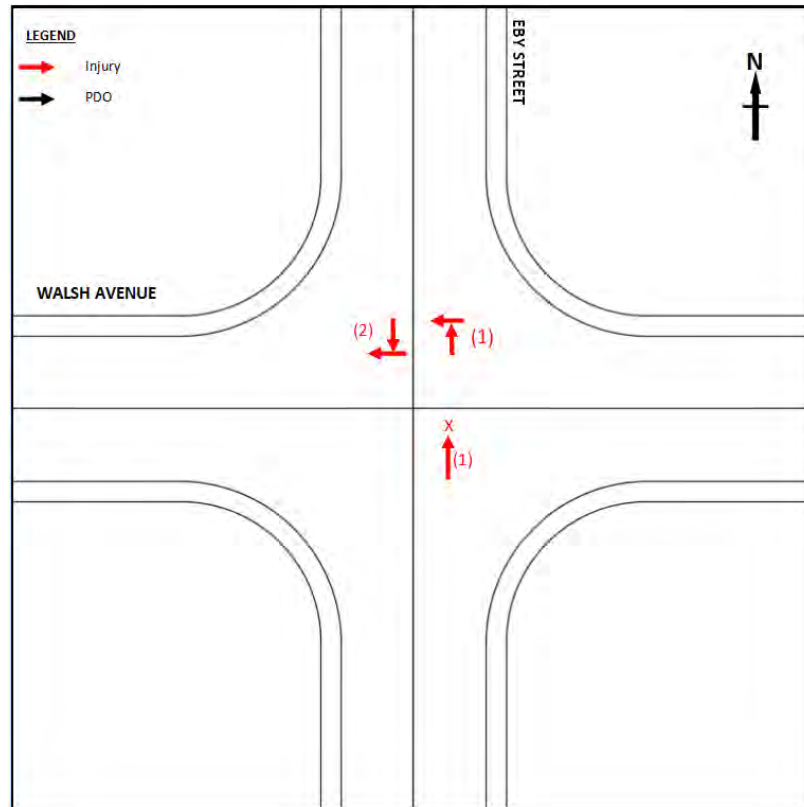


Figure 77: Collision Diagram at Walsh Ave at Eby Street

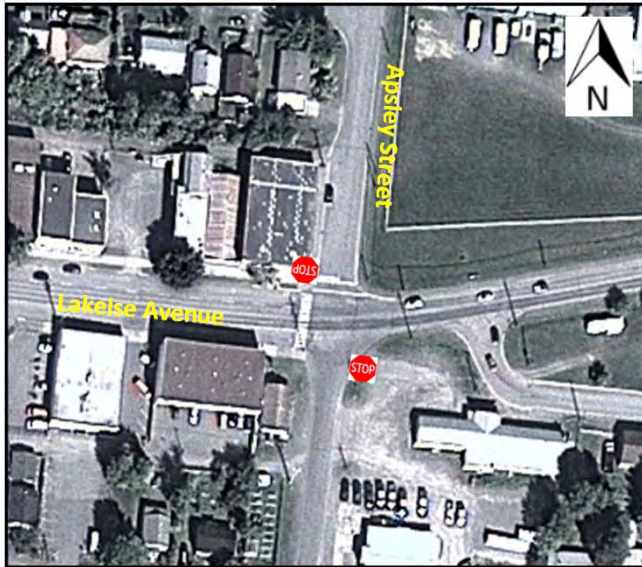
Potential Solutions:

The trend with the strongest potential for correctability is the non-compliance with the stop sign on the westbound approach. The narrow road and the visual cues on this approach suggest a continuing roadway. The stop sign appears well placed, but should be made of micro-prismatic reflective material to improve visibility. Also, a stop line should be painted on the westbound approach to match that on the opposing approach.

The pedestrian incident could be addressed with the installation of a signed and marked crosswalk if the technical warrants for a crosswalk are satisfied. If this is also a designated route to school, School Crosswalk signs could be used.

Although not related to any observed collision trends, the abundant foliage in the southwest corner of the intersection may be obstructing sight lines looking from Walsh Avenue to the south. These trees should be pruned as necessary to ensure safe sight lines are maintained at the intersection.

6.2.14 Lakelse Avenue at Apsley Street



Description:

The intersection of Lakelse Avenue and Apsley Street has been identified as the east gateway to Downtown Terrace, since Lakelse Avenue connects the Downtown to the Old Skeena Bridge. Apsley Street connects Greig Avenue to a multi-family development further north (Figure 78). Both roads are classified as collectors.

The west leg of Lakelse Avenue is four lanes; the other three legs are two lanes. The estimated average daily entering traffic volume is 7,500 vpd. Both roads have posted speeds of 50 km/h.

Figure 78: Lakelse Ave at Apsley Street

Collision Analysis:

Within the recent five year study period, there were 5 reported incidents (i.e. 1 per year on average). The obvious trends in the collision data were as follows (Table 25 and Figure 79):

1. Two of the records reference the same multi-vehicle collision in January 2013. This was caused by multiple rear ends, which may have been in adverse winter conditions.
2. Four of the collisions occurred in the daytime, between 10:00 AM and 5:00PM.
3. Four of the reported incidents were classified as rear ends, apparently caused by driver inattention.
4. One incident involved a left turn collision on Lakelse Avenue.

Table 24: Collision Types at Lakelse Ave at Apsley Street

Crash Types	PDO	Injury	Total
Rear End	1	3	4
Left Turn	1		1
Rear End – Right Turn			
Side Impact			
Sideswipe – Same Direction			
Sideswipe – Opposite Direction			
Single Vehicle			
Head On			
Total	2	3	5

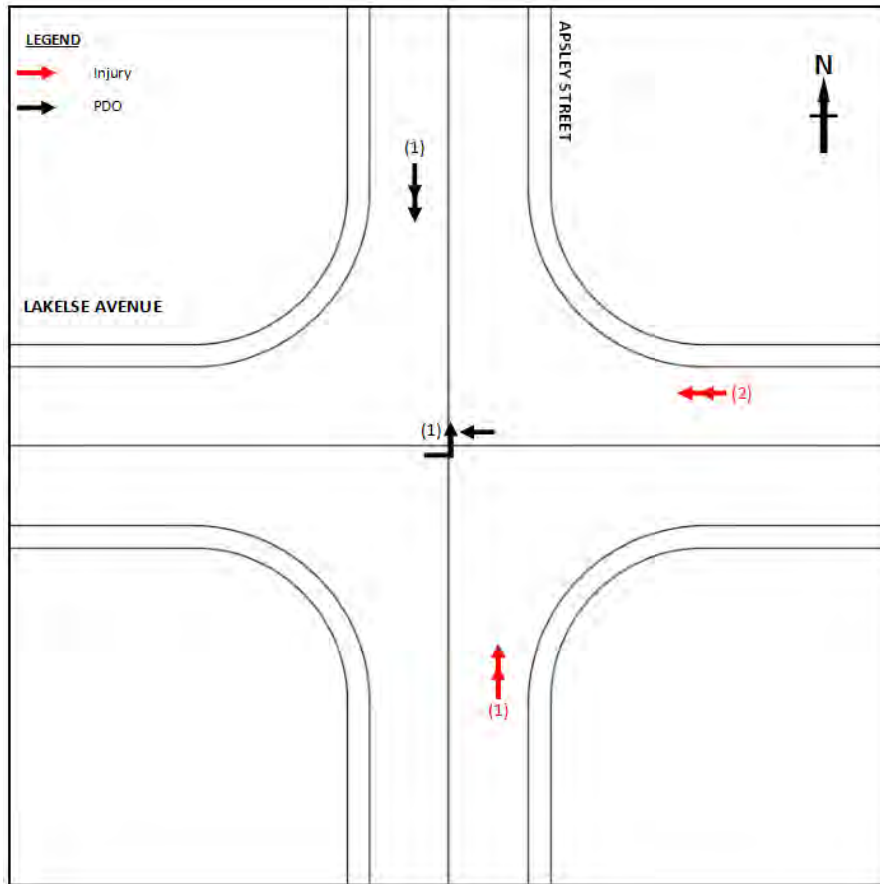


Figure 79: Collision Diagram at Lakelse Ave at Apsley Street

Potential Solutions:

Although only represented by one collision, the incident with the highest potential for correctability appears to be the left turn collision. The conversion of the west leg of Lakelse Avenue to a two lane section with a Two Way Left Turn Lane may facilitate left turns by separating them from the traffic stream. As this intersection currently transitions between the two and four lane sections on Lakelse Avenue, the design of the transition will be critical.

The rear end incidents on Apsley Street may be reduced with stop lines, which currently do not exist on the northbound approach.

The rear end issue on Lakelse Avenue may be addressed through road maintenance. The road could be more icy than other roads at times due to the proximity to the river.

6.2.15 Lakelse Avenue at Sparks Street



Description:

The signalized intersection of Lakelse Avenue and Sparks Street is located in the middle of Downtown Terrace (Figure 80). Both roads are classified as collectors. Lakelse is four lanes through the intersection, and Sparks Street is two lanes, with right turn lanes on each approach.

There is an offset of approximately 20 metres between the Sparks Street approaches. This requires the signal to operate as a split phase, serving northbound and southbound traffic separately. The estimated average daily entering traffic volume is 9,400 vpd. Both roads are posted at 50 km/h.

Figure 80: Lakelse Ave at Sparks Street

Collision Analysis:

Within the recent five year study period, there were 10 reported incidents (i.e. 2 per year on average). The incidents were evenly distributed throughout the seasons. The obvious trends in the collision data were as follows (Table 26 and Figure 81):

1. Only three collisions involved injuries, indicating typically lower speeds involved.
2. There were 7 collisions that occurred between the hours of 9:00AM and 3:00PM, when the activity Downtown is generally highest.
3. Three incidents involved rear end collisions, two of which were on the southbound approach on Sparks Street.
4. Three incidents involved right turn movements
5. Lane changing on Lakelse Avenue was cited as a contributing factor in at least three collisions.
6. One incident involved an eastbound cyclist on Lakelse Avenue being hit by a vehicle turning southbound left from Sparks Street.
7. One incident involved a pedestrian being hit in the crosswalk on Sparks Street.

Table 25: Collision Types at Lakelse Ave at Sparks Street

Crash Types	PDO	Injury	Total
Rear End	3	1	4
Left Turn		1	1
Rear End – Right Turn			
Side Impact	1		1
Sideswipe – Same Direction	2		2
Sideswipe – Opposite Direction			
Single Vehicle	1	1	2
Head On			
Total	7	3	10

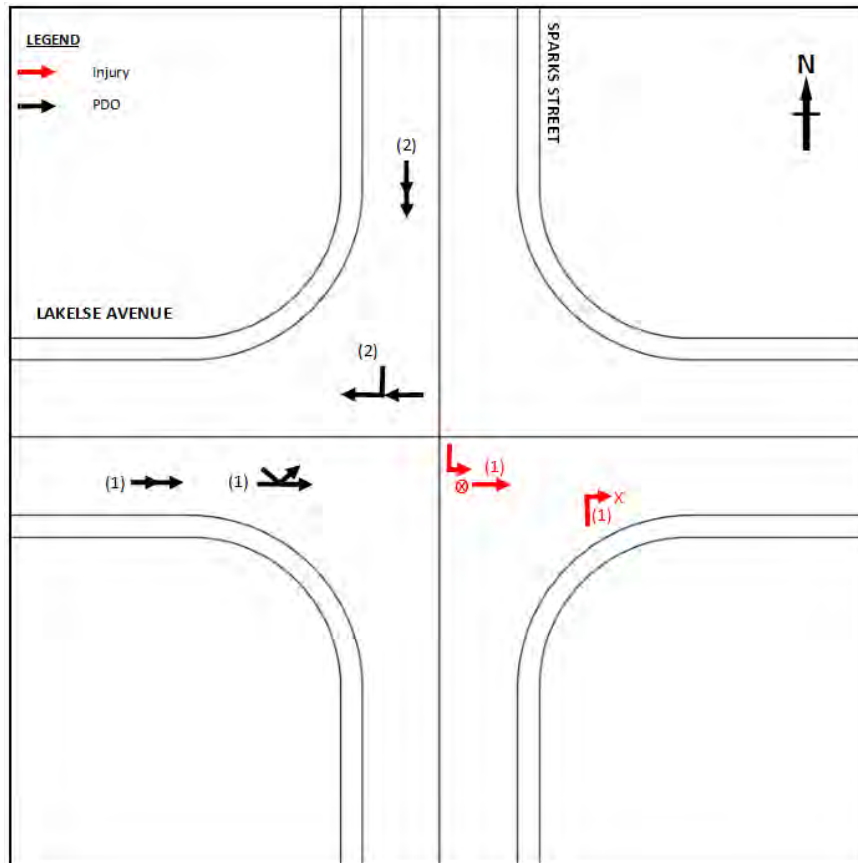


Figure 81: Collision Diagram at Lakelse Ave at Sparks Street

Potential Solutions:

The trend in collisions associated with lane changing has the greatest potential for correctability. This could be addressed by implementing a lane diet on Lakelse Avenue, which would replace one through lane in each direction with a Two Way Left Turn Lane. This lane diet would also provide more space for cyclists, which should reduce the potential for other cycling incidents.

Another option would be to realign Sparks Street to eliminate the offset T intersections. This would prevent drivers from having to complete an “S” Turn manoeuvre as they travel northbound or southbound through the intersection. The realignment would also have the benefit of reducing the demands on the drivers’ attention by providing a more conventional intersection configuration. As traffic volumes grow in the Downtown, both the current offset “T” configuration and the associated signal phasing to accommodate it will likely become more problematic.

The trend in rear end collisions could be addressed by upgrading the signal heads with higher intensity LED bulbs, and reflective yellow backboards.

6.2.16 Park Avenue at Kenney Street



Description:

The intersection of Park Avenue and Kenney Street is located west of the Downtown (Figure 82). Both roads are classified as collector roads, although Kenney Street is the busier road. Kenney Street has bicycle lanes, curb/gutter, and a sidewalk. Traffic on Kenney Street is free-flowing through the intersection. Park Avenue is narrow east of Kenney Street, and has open shoulders. Traffic on Park Avenue has a stop condition at Kenney Street. There are no turning lanes at the intersection.

The estimated average daily traffic volume entering the intersection is 6,300 vpd. Both roads are posted at 50 km/h.

Figure 82: Park Ave at Kenney Street

Collision Analysis:

Within the recent five year study period, there were 4 reported incidents (i.e. 1 per year on average). The obvious trends in the collision data were as follows (Table 27 and Figure 83):

1. All of the incidents involved injuries, which suggested higher speeds involved.
2. Three of the four incidents occurred in 2010, which may suggest any intersection improvements or changes in traffic patterns may have addressed the issue.
3. Three of the incidents involved drivers on Park Avenue missing the stop sign.
4. One incident involved a pedestrian on Park Avenue, but details were not provided.

Table 26: Collision Types at Park Ave at Kenney Street

Crash Types	PDO	Injury	Total
Rear End			
Left Turn			
Rear End – Right Turn			
Side Impact		3	3
Sideswipe – Same Direction			
Sideswipe – Opposite Direction			
Single Vehicle			
Unknown		1	1
Total		4	4

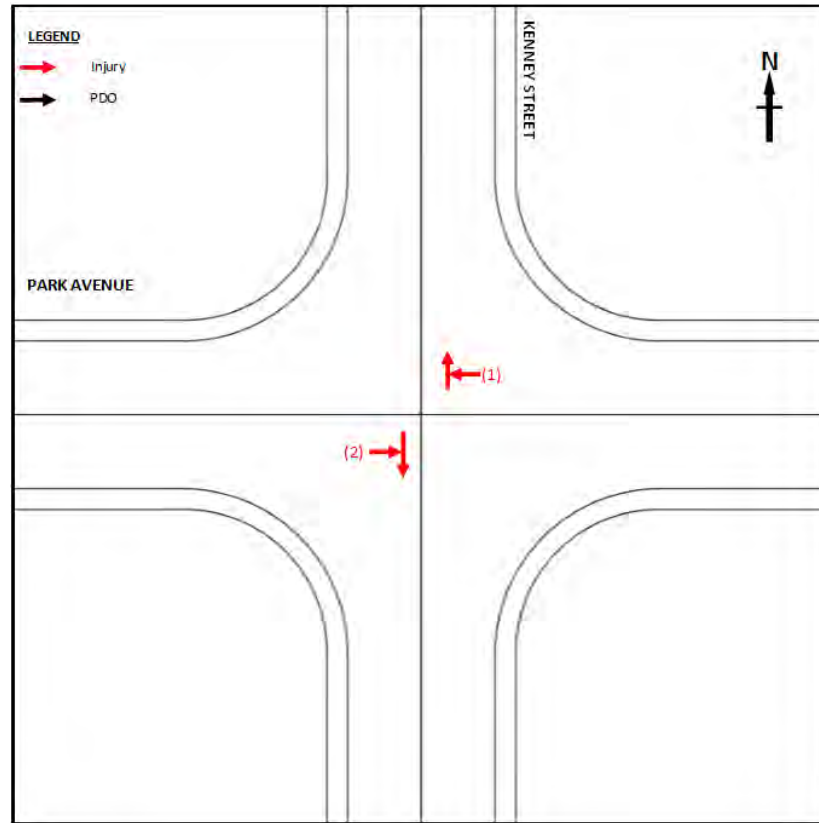


Figure 83: Collision Diagram at Park Ave at Kenney Street

Potential Solutions:

The trend with the strongest potential for correctability is the non-compliance with the stop signs on Park Avenue. The narrow road on the east approach, and the visual cues on both approaches, suggest a continuing roadway, which may be exacerbated in hours of darkness. The visibility of the stop condition could be improved with micro-prismatic reflective sign material, and stop lines on both sides of the intersection.

The sight lines should also be kept clear at the intersection.

6.2.17 Hwy 16 (Keith Ave) at Tetrault Street



Description:

The “T” intersection of Highway 16 (Keith Avenue) and Tetrault Street is located just east of the signalized Sande Street intersection (Figure 84). Northbound traffic approaching the highway on Tetrault Street has a stop condition, with a left turn restriction. Tetrault Street is a primary signed access route to the Terrace Hospital to the south.

Highway 16 is four lanes through the intersection, and Tetrault Street is a two lane local road. There are no turning lanes at the intersection except for a new eastbound right turn lane installed in 2016. The estimated average daily entering traffic volume is 18,000 vpd (almost all of which is on Highway 16). Both roads are posted at 50 km/h.

Figure 84: Hwy 16 (Keith Ave) at Tetrault Street

Collision Analysis:

Within the recent five year study period, there were 11 reported incidents (i.e. 2 per year on average). The collisions were evenly distributed over the past 5 years, which includes the years since the left turn restriction has been in place. There were likewise no apparent trends associated with the seasons or the days of the week. The obvious trends in the collision data were as follows (Table 28 and Figure 85):

1. Only three of the collisions involved injuries, potentially indicating lower speeds.
2. Ten of the collisions occurred during work hours, between 8:00AM and 5:00PM, when the traffic volumes are heaviest.
3. Three of the incidents were westbound rear end collisions with vehicles stopped to turn left into Tetrault Street.
4. Two of the incidents involved illegal left turns from Tetrault Street colliding with eastbound through traffic on the highway.
5. Two of the incidents involved northbound rear ends at the stop sign on Tetrault Street.
6. Two of the incidents involved pedestrians, but these were not part of a trend.

Table 27: Collision Types at Hwy 16 (Keith Ave) at Tetrault Street

Crash Types	PDO	Injury	Total
Rear End	2		2
Left Turn	2		2
Rear End – Left Turn	1	2	3
Sideswipe – Same Direction	2		2
Single Vehicle	1	1	2
Head On			
Total	8	3	11

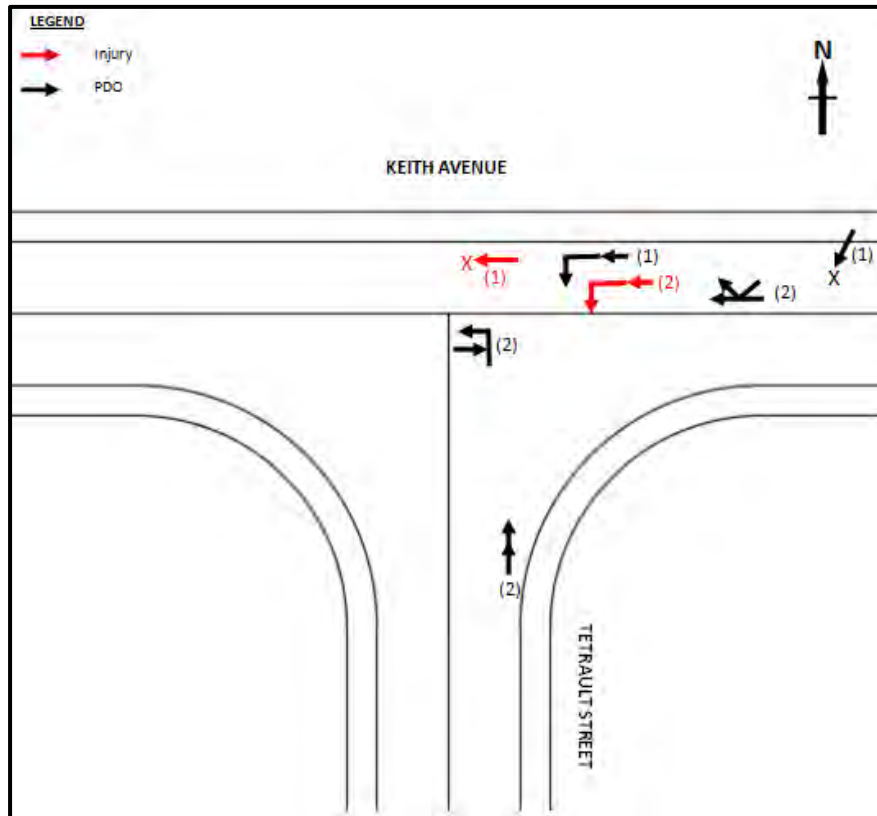


Figure 85: Collision Diagram at Hwy 16 (Keith Ave) at Tetrault Street

Potential Solutions:

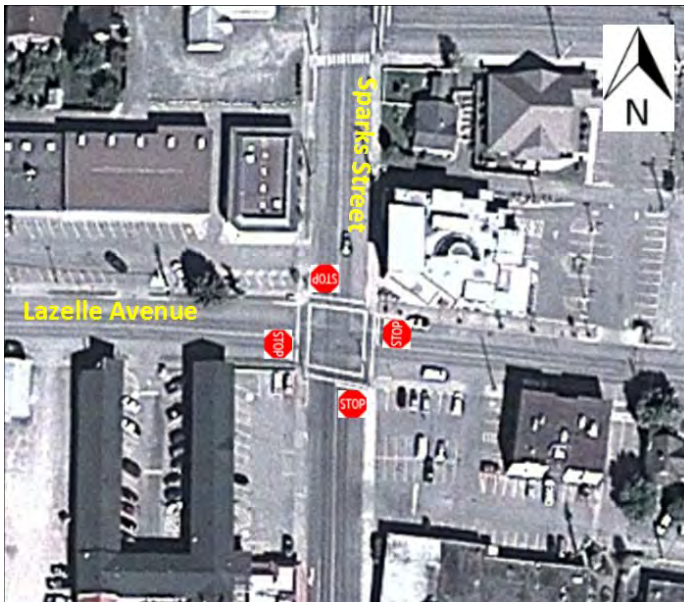
The trends with the strongest potential for correctability are illegal left turns from Tetrault Street, and the rear ends collisions on the highway and Tetrault Street. All three can be addressed by relocating the hospital access to create a fourth (south) leg at the signalized intersection at Sande Street. This relocation would address the collision trends as follows:

1. Trips leaving the hospital would have direct signalized access to the highway. Drivers would not have to make circuitous diversions, and would thus be less inclined to make illegal left turns.
2. The demand for westbound left turns at Tetrault Street would be less if removed as the official hospital route. This in turn would reduce the incidence of rear ends.

If the hospital access cannot be relocated to Sande Street, a westbound left turn lane would be another alternative to improve the safety on the route to the hospital. However, additional right-of-way would be necessary to accommodate this widening.

Additional enforcement should also be considered at the intersection to prevent illegal northbound left turn movements.

6.2.18 Lazelle Avenue at Sparks Street



Description:

The intersection of Lazelle Avenue and Sparks Street in Downtown Terrace is located immediately north of the offset “T” intersection at Lakelse Avenue (Section 6.2.15). The intersection is controlled as a four-way stop (Figure 86).

All four legs of the intersection are two lanes. Although there are no dedicated turning lanes, there is sufficient road width to accommodate separated right turn movements.

The estimated average daily entering traffic volume is 7,500 vpd. Both roads are posted at 50 km/h.

Figure 86: Lazelle Avenue at Sparks Street

Collision Analysis:

Within the recent five year study period, there were 5 reported incidents (i.e. 1 per year on average). The obvious trends in the collision data were as follows (Table 29 and Figure 87):

1. Only one collision involved an injury, which suggests slower speeds.
2. Three of the collisions occurred in winter months, indicating a potential issue with winter conditions.
3. All five collisions occurred in the afternoon hours, between 1:30PM and 4:30PM, when traffic volumes are heaviest.
4. One collision was caused by two concurrent right turns being made from the same approach.
5. Due to the low volume of collisions, there was no clear trend in collision types.

Table 28: Collision Types at Lazelle Avenue at Sparks Street

Crash Types	PDO	Injury	Total
Rear End	1		1
Left Turn			
Rear End – Right Turn	1		1
Side Impact			
Sideswipe – Same Direction	1		1
Sideswipe – Opposite Direction			
Single Vehicle	1		1
Unknown		1	1
Total	4	1	5

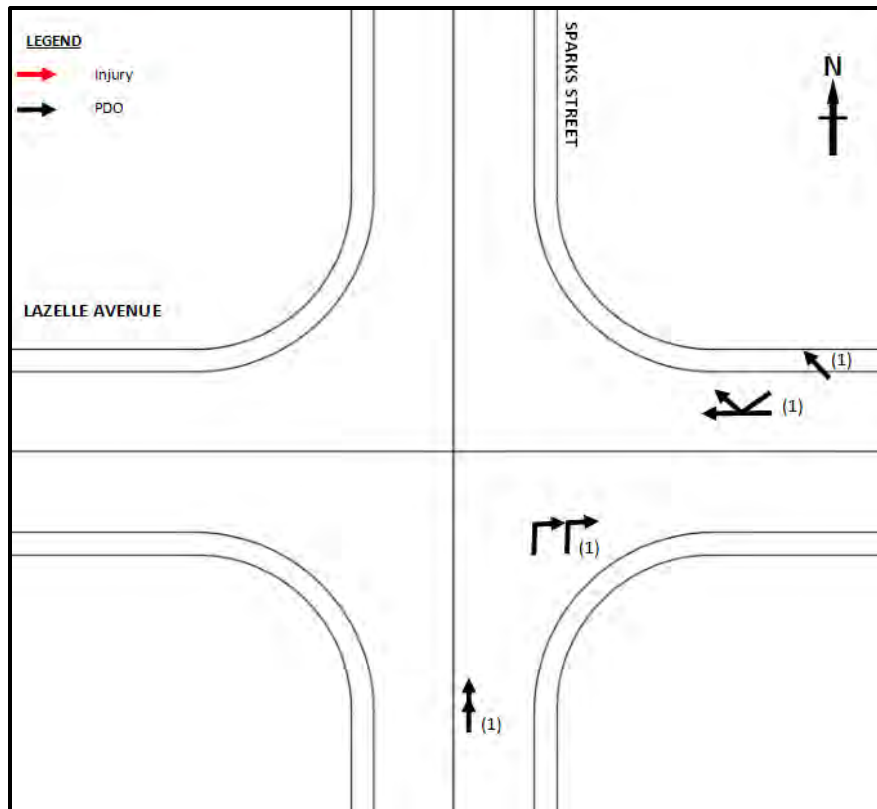


Figure 87: Collision Diagram at Lazelle Avenue at Sparks Street

Potential Solutions:

The collision with the strongest potential for correctability was related to the double right turn movement. On approaches with relatively heavy right turn movements (e.g. the northbound right), a short turning lane could be painted within the available width to clarify the guidance for drivers.

With the trend of collisions occurring in winter, this intersection should be well-maintained with the rest of the Downtown.

6.2.19 Lakelse Avenue at Emerson Street



Description:

The intersection of Lakelse Avenue and Emerson Street in Downtown Terrace is controlled by a two phase traffic signal (Figure 88). The west leg of Lakelse Avenue is four lanes, with the right lane on the eastbound approach restricted to right turns. The east leg of Lakelse Avenue is two lanes only. Both approaches on Emerson Street have one through-left lane, and a right turn lane.

Left turns on Lakelse Avenue are restricted from 9AM to 6PM to keep traffic flowing. The estimated average daily entering traffic volume is 7,900 vpd. Both roads are posted at 50 km/h.

Figure 88: Lakelse Avenue at Emerson Street

Collision Analysis:

Within the recent five year study period, there were 6 reported incidents (i.e. 1 per year on average). The obvious trends in the collision data were as follows (Table 30 and Figure 89):

1. Four of the collisions involved injuries, especially with vulnerable road users.
2. All collisions occurred in the afternoon, between 12:30PM and 5:30PM, when Downtown activity is greatest.
3. One incident involved a 90 degree collision between a southbound vehicle on Emerson Street and an eastbound vehicle on Lakelse Avenue.
4. Two incidents involved pedestrians crossing at the crosswalk.
5. One incident involved a cyclist.

Table 29: Collision Types at Lakelse Avenue at Emerson Street

Crash Types	PDO	Injury	Total
Rear End	1		1
Left Turn			
Side Impact		1	1
Sideswipe – Same Direction	1		1
Sideswipe – Opposite Direction			
Pedestrian		2	2
Cyclist		1	1
Head On			
Total	2	4	6

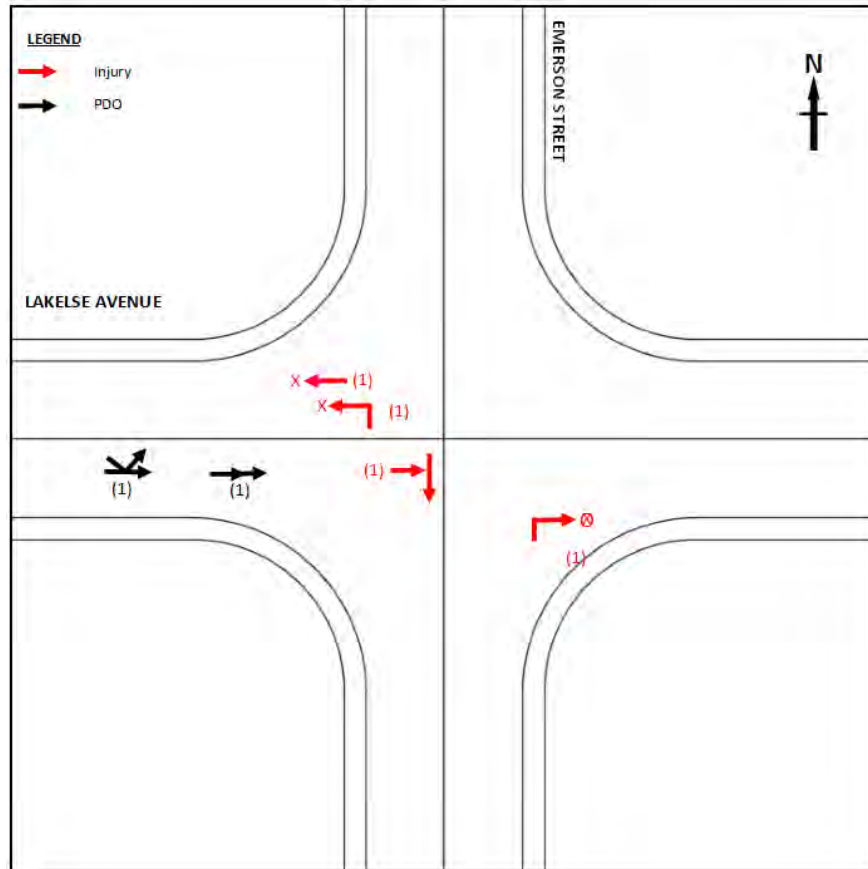


Figure 89: Collision Diagram at Lakelse Avenue at Emerson Street

Potential Solutions:

The trend with the most potential for correctability is with drivers not correctly observing the traffic signals. This was a concern in the 90 degree collision, and may have contributed to the two pedestrian collisions. The signal heads should be upgraded with higher intensity LED bulbs, and reflective yellow backboards.

Although there was no evidence to suggest the pedestrians involved in the collisions were jaywalking, the safety of the pedestrian crossings could still be improved with the use of countdown signals. These alert pedestrians to how much time they have remaining to cross.

The proposed lane diet on Lakelse Avenue would also improve the safety of this intersection by (a) providing a traffic calming effect, (b) reducing the demand for lane changes, and (c) affording more space for cyclists.

6.2.20 Straume Avenue at Kalum Street



Description:

The intersection of Straume Avenue and Kalum Street has stop conditions on the eastbound and westbound (Straume Ave) approaches (Figure 90). Straume Avenue is a narrow two lane local road. Kalum Street is a collector that connects the Downtown to the east side of the Upper Bench, and has recently had a lane diet from four lanes to two lanes with a Two Way Left Turn Lane. There are no other turning lanes at the intersection.

The estimated average daily entering traffic volume is 6,300 vpd. Both roads are posted at 50 km/h. A marked crosswalk exists on Kalum Street, on the south side of the intersection.

Figure 90: Straume Avenue at Kalum Street

Collision Analysis:

Within the recent five year study period, there were 4 reported incidents (i.e. 1 per year on average). The obvious trends in the collision data were as follows (Table 31 and Figure 91):

1. Two of the collisions occurred in winter, potentially indicating an issue with winter conditions.
2. All of the collisions occurred in the daytime hours, between 9:00AM and 5:30PM.
3. Three of the collisions involved rear ends. One was due to stopping for a pedestrian at the crosswalk, and the other two were reversing manoeuvres on Straume Avenue.

Table 30: Collision Types at Straume Avenue at Kalum Street

Crash Types	PDO	Injury	Total
Rear End	1	2	3
Left Turn			
Rear End – Right Turn			
Side Impact			
Sideswipe – Same Direction	1		1
Sideswipe – Opposite Direction			
Single Vehicle			
Head On			
Total	2	2	4

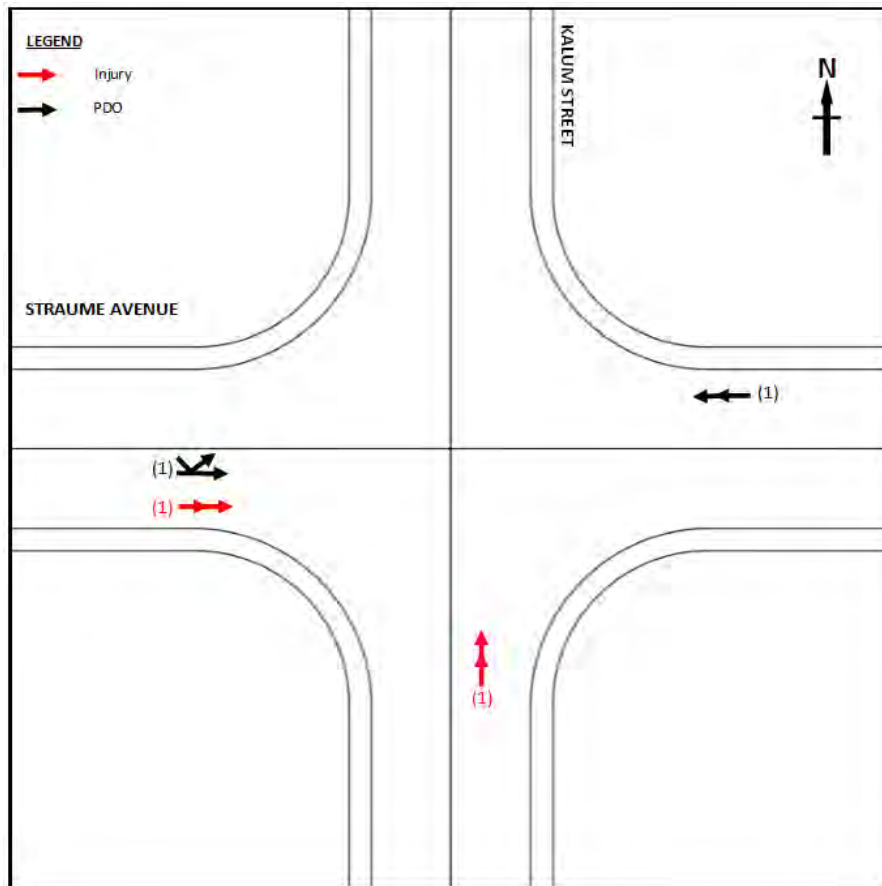


Figure 91: Collision Diagram at Straume Avenue at Kalum Street

Potential Solutions:

The only potential correctable issue is with the rear end collision on Kalum Street. The crosswalk should be upgraded with standard signing to ensure drivers see and stop at the crosswalk as necessary.

The two rear ends associated with reversing manoeuvres on Straume Avenue are likely already resolved by the new lane diet on Kalum Street. Both collisions occurred before 2012, when Kalum Street was four lanes. With the new laning design, the presence of the extra shoulder width on Kalum Street should reduce the incidence of reversing manoeuvres.

6.3 PARKING-RELATED COLLISIONS

Within the five year analysis, there were 2,159 collisions in the ICBC records which were classified as being related to parking manoeuvres. These were mostly in private parking lots. The collisions were typically of low severity, with only 3% identified as involving injuries.

Approximately half of the collision records had GPS coordinates, which have been spatially represented in Figure 92. Larger circles indicate locations with more frequent parking-related collisions.

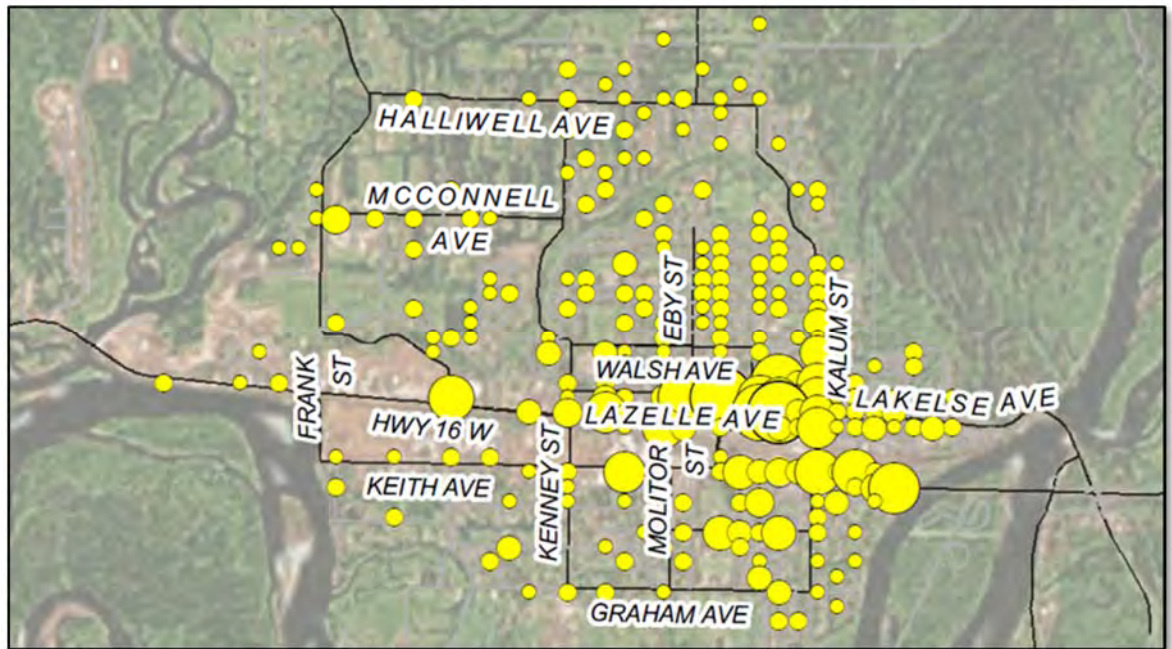


Figure 92: Locations of Parking-Related Collisions

The circles represent both on-street and off-street (i.e. parking lot) collisions. The areas with the highest frequency of parking collisions are listed in Table 32 below.

Table 31: Locations with High Frequency of Parking-Related Collisions

Rank	Street Name	Block	From	To	Reported Collisions	Comments
1	Lakelse Avenue	4600	Kalum Street	Sparks Street	108	80% identified in private parking lots.
2	Lakelse Avenue	4700	Sparks Street	Eby Street	99	85% identified in private parking lots.
3	Park Avenue	4600	Kalum Street	Sparks Street	35	65% identified in private parking lots.
4	Highway 16 (Keith Ave)	4600	Kalum Street	Sparks Street	34	95% identified in private parking lots, with 15% occurring at the site access.
5	Highway 16 (Keith Ave)	4400	Kerr Street	Cramer Street	31	100% identified in private parking lots.
6	Lazelle Avenue	4600	Kalum Street	Sparks Street	29	50% identified in private parking lots, with 20% listed as due to access sight distance.
7	Lazelle Avenue	4700	Sparks Street	Eby Street	22	55% identified in private parking lots.
8	Kalum Street	3300	Hwy 16	Loen Avenue	18	55% identified as related to on-street parking.
9	Lakelse Avenue	4800	Sparks Street	Eby Street	17	80% identified in private parking lots, with 20% related to on-street parking.
10	Highway 16	4800	Eby Street	Kenney Street	16	100% identified in private parking lots.
11	Highway 16	5100	Brooks Street	Kalum Lake Road	16	100% identified in private parking lots.
12	Greig Avenue	4500	Clinton Street	Kalum Street	16	95% identified in private parking lots, with one identified at the access.
13	Haugland Avenue	4700	Sparks Street	Eby Street	15	65% identified in private parking lots, with two identified at the access.
14	Keith Avenue	4900	Sande Street	Kenney Street	13	85% identified in private parking lots, with one identified at the access.
15	Highway 16	4900	Munroe Street	Kenney Street	10	100% identified in private parking lots.
16	Highway 16	5000	Kenney Street	Kalum Lake Road	10	100% identified in private parking lots, with 25% identified at the access.
17	Lazelle Avenue	4800	Eby Street	Munroe Street	10	85% identified in private parking lots, with 25% identified at the access.
18	Legion Avenue	4400	Cul-De-Sac	Apsley Street	10	90% identified in private parking lots.
19	McConnell Avenue	5300	Floyd Street	Kalum Lake Road	10	90% identified in private parking lots.

As noted in the table, the majority of parking related collisions occurred in private parking lots. Although this is outside the scope of the Traffic Management Plan, the strong trend underscores the importance of the design and maintenance of parking lots, and the accesses thereto. The sight distance at accesses in particular should be managed through on-street parking restrictions.

There were also a few collision trends associated with on-street parking in the Downtown. This supports the proposed lane diets on Lakelse Avenue and Kalum Street, which tend to provide additional buffer between parked vehicles and street traffic. A Downtown Parking Study would also help determine a safe strategy for on-street parking.

7 ACTIVE TRANSPORTATION ISSUES

7.1 PEDESTRIAN AND CYCLE NETWORKS

According to the City's Active Transportation Plan (Ref. 10), there are a total of 33 km of sidewalks, and 11 km of walkways and trails in Terrace in 2009. Only 40% of roads were identified as having sidewalks. The priorities for new sidewalks should be on arterial and collector roads (by virtue of their typically higher traffic volumes and bus routes), and around schools, as shown in Figure 93.

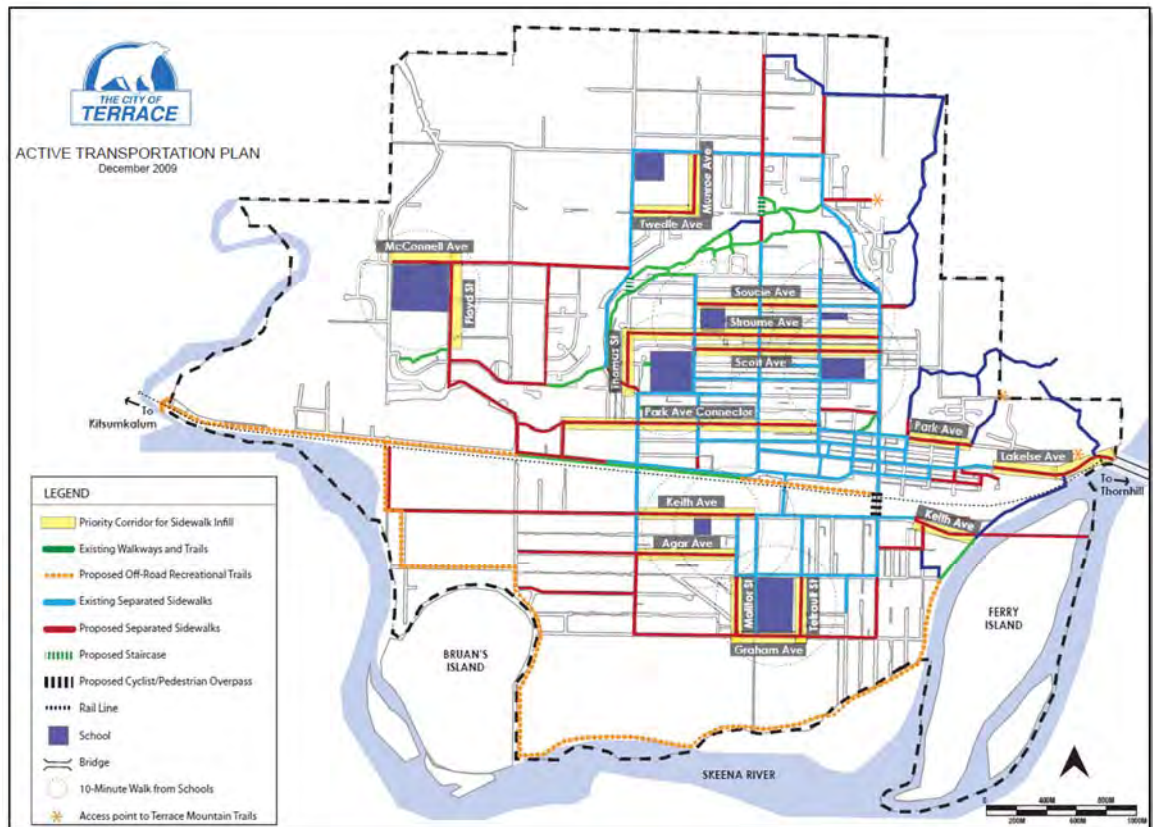


Figure 93: Pedestrian Network Priorities
(source: Terrace Active Transportation Plan)

The Active Transportation Plan also identified a total of 8 km of on-road cycling facilities in Terrace, including both marked routes (e.g. Eby Street, Sparks Street, and Kalum Street) and unmarked routes (e.g. Halliwell Avenue, Skenaview Drive, and Lanfear Drive). The study also identified 5 km of off-road facilities, including the Howe Creek Trail and Grand Trunk (Millennium) Pathway. To facilitate cycling trips, a comprehensive and integrated bicycle network should be developed, as outlined in Figure 94.

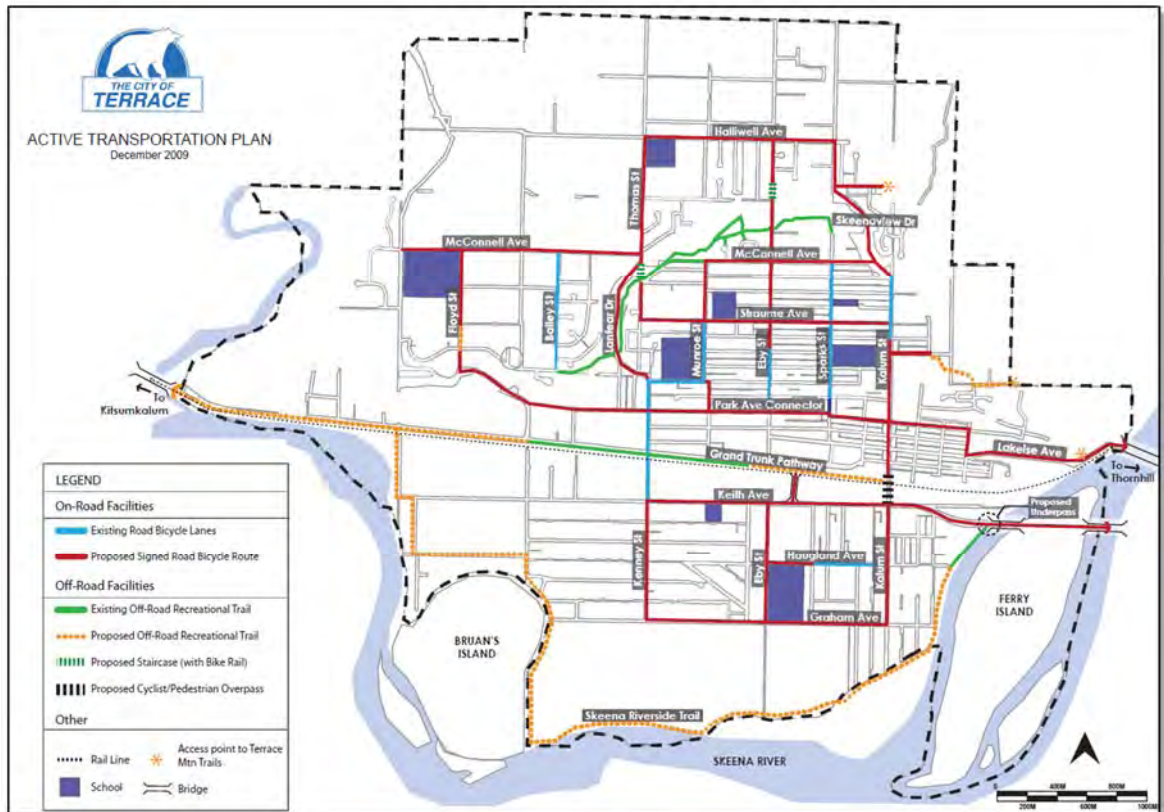


Figure 94: Bicycle Network Priorities
(source: Terrace Active Transportation Plan)

The four key issues identified by the Active Transportation Plan which affect the Transportation Master Plan are as follows:

1. The grade-separated trail connection across the CN line, which is critical for connecting neighbourhoods, facilitating active transportation, and improving the safety of residents who might otherwise be tempted to cross the train tracks at grade.
2. The trail and stairway connections to the Upper Bench, which would provide a safer and more aesthetic choice than is currently offered on Lanfeer Drive and Skenaview Drive.
3. The trail connection between the Old Skeena Bridge and the New Skeena Bridge, which may be used for both a recreational loop, and also a commuter connection to Thornhill.
4. The Howe Creek Trail crossing at the bottom of Lanfeer Drive, which will become an increasing concern as traffic volumes and trail user volumes grow.

7.2 TRANSIT SYSTEM

As illustrated in Table 2, the transit mode has only 1% of the Terrace commuter mode share, based on 2006 census data. This is far less than the 10% average for BC. The excess capacity on the roadways, the abundant parking, and the winter climate, all contribute to the convenience and preference of the personal automobile in Terrace.

As the population grows over the next ten years, the available road capacity and parking supply are expected to diminish somewhat. Furthermore, a larger number of residents may choose not to drive. All this should help shift local trips to the transit system.

The existing transit service (Figure 95) was raised frequently as a concern in the public consultation. To address these concerns and prepare the city for the expected growth, a formal Transit Plan should be developed for Terrace. The Plan should include a review of the existing and potential ridership, the routes and schedules, the on-street bus stop infrastructure, a potential transit exchange at the Skeena Mall, and a transit policy to facilitate future transit planning and operational decisions.

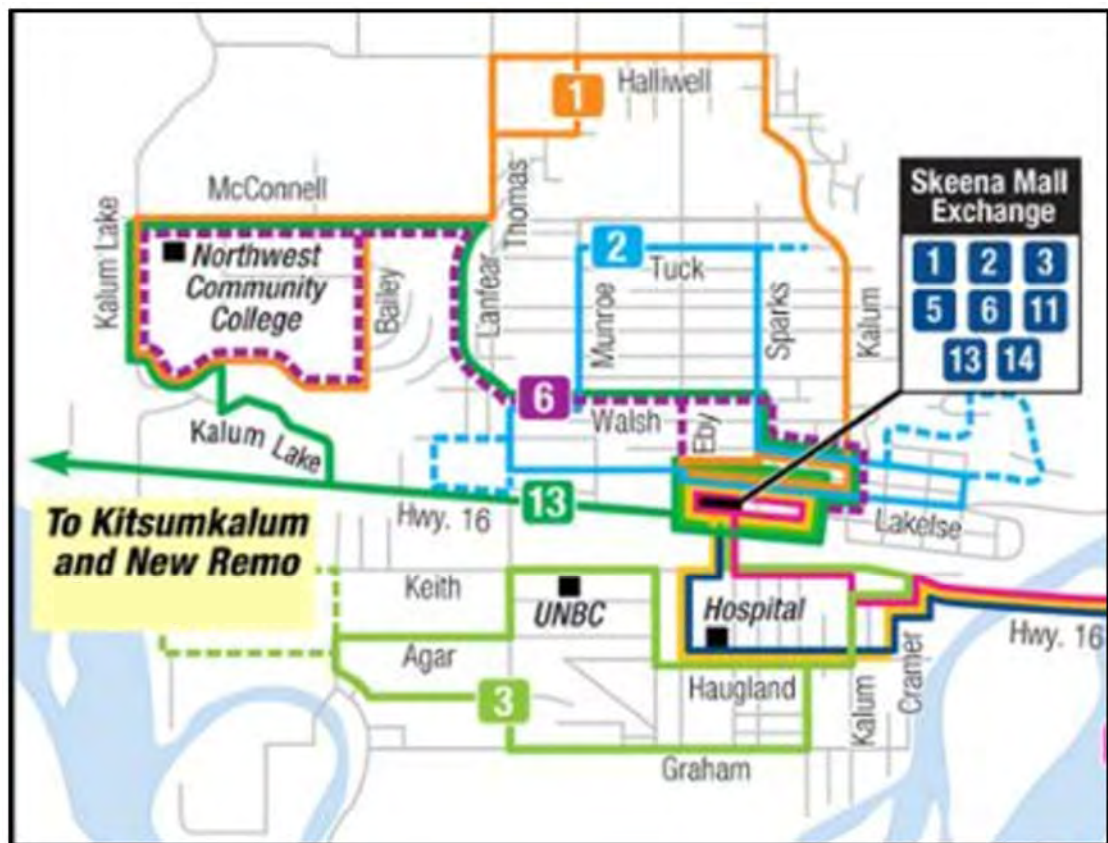


Figure 95: Terrace Transit System
(source: BC Transit)

8 SUMMARY OF ISSUES AND CONCERNS

Based on the input from the public and stakeholders, the review of background literature, and the technical analysis, the following list of issues and concerns was compiled.

8.1 MAJOR NETWORK ISSUES

There were six major network issues confirmed in the Transportation Master Planning process, as outlined in Table 33 below. Each involves a comprehensive level of analysis and design, and multi-million dollar budgets.

Table 32: Major Transportation Network Issues

No.	Location	Description of Issue(s)	Literature	Consultation	Traffic Analysis	Safety Analysis
1.	Proposed grade-separated rail crossing, west of Sande Street	The Highway 16 (Sande Street) overpass is the only available connection between the north and south areas of Terrace for vehicles, pedestrians and cyclists when trains are passing through the city. This divides the City, and affects emergency response.	✓	✓	✓	✓
2.	Proposed grade-separated rail crossing for pedestrians	There is a significant demand for pedestrian crossings at the CN railway tracks in the vicinity of Kalum Street, which is a safety concern due to the 14 tracks at that location.	✓	✓		
3.	Lanfear Drive	The existing connections to the Bench (i.e. via Lanfear Drive and Skeenaview Drive) are steep and windy, with concerns about pedestrian/cyclist safety, and speeding motorists, especially in consideration of future growth expected in the Bench area. Lanfear Drive is considered to be the higher priority.	✓	✓	✓	✓
4.	Skeenaview Drive					
5.	Keith Avenue	Keith Avenue is a significant truck route with a collision-prone intersection at Kenney Street. The road is a candidate to be the designated truck route, but requires upgrading and a grade-separated connection back to the highway (see No. 1 above).	✓	✓	✓	✓
6.	Park Avenue	The extension of Park Avenue should be considered as a future network solution, especially between Eby Street and Munroe Street. Ultimately, Park Avenue should be extended to Kalum Lake Road.	✓		✓	✓

8.2 ISSUES WITH SPECIFIC LOCATIONS

Table 34 outlines the 25 issues that were identified with specific locations in Terrace, and the source(s).

Table 33: Summary of Specific Issues

No.	Location	Description of Issue(s)	Literature	Consultation	Traffic Analysis	Safety Analysis
1.	Keith Avenue at Kenney Street	Identified as a concern in the Safety Analysis (2/20) due to a strong trend in collisions due to non-compliance with the stop signs. The two-way stop causes delays and safety concerns, especially with heavy truck traffic and potential obstructions to the sight distance. A four way stop is warranted now.		✓	✓	✓
2.	Lakelse Avenue	The existing four lane cross section of Lakelse Avenue results in concerns about available lane width (esp. for larger vehicles), on-street parking conflicts, traffic speeds, and the safety of crossing pedestrians.	✓	✓	✓	✓
3.	Lakelse Avenue at Sparks Street	Identified as a concern in the Safety Analysis (15/20) due to a trend in collisions associated with weaving manoeuvres. The offset T intersection causes delays, and concerns for the safety of motorists and pedestrians. This intersection must be considered in conjunction with the intersection of Lazelle Avenue and Sparks Street.		✓	✓	✓
4.	Lakelse Avenue at Eby Street	The existing traffic control is confusing to some drivers, causes delays and safety concerns, and will cause the intersection performance to fail by 2025. This intersection must be considered in conjunction with the intersection of Eby Street / Lazelle Avenue, where there is an existing merging conflict in the northbound direction.		✓	✓	
5.	Thomas Street at McConnell Avenue	The offset T intersection creates concerns with intersection geometry, restricted sight lines, traffic safety and congestion/delays in the peak hours.		✓	✓	
6.	Lanfear Drive at Thomas/Pheasant	Traffic and pedestrian safety at the bottom of Lanfear Hill is a concern due to traffic speeds, road geometry, limited sight distance, and the demand for crossing pedestrians.	✓	✓	✓	
7.	Park Avenue at Kalum Street	Identified as a concern in the Safety Analysis (5/20) due to a trend in drivers not observing the traffic signal. Also identified by public/stakeholders as a concern, especially with the transition to the Two-Way Left Turn Lane.		✓	✓	✓
8.	Lakelse Avenue at Kalum Street	Identified as a concern in the Safety Analysis (8/20) due to a trend in rear ends. The four lane section impedes left turning sight lines.		✓	✓	✓
9.	Lazelle Avenue at Kalum Street	Identified as a concern in the Safety Analysis (4/20) due to trends in rear ends and 90 degree collisions. There are concerns for the safety of pedestrians crossing Kalum Street, esp. around Lazelle Avenue.		✓		✓
10.	Scott Avenue at Eby Street	Identified as a concern in the Safety Analysis (6/20) due to a recent fatality, and a trend in drivers not complying with the stop signs.				✓
11.	Skeenaview Drive (Sparks Street) at Munthe Avenue	There is concern for the safety of the Munthe Avenue intersection at the top of Skeenaview Drive, due to the limited sight distance.		✓	✓	
12.	Kalum Street	The existing lane diet at Park Avenue could be extended south.			✓	
13.	Walsh Avenue at Eby Street	Identified as a concern in the Safety Analysis (13/20) due to drivers not complying with the stop signs. A crosswalk may be necessary.		✓		✓

No.	Location	Description of Issue(s)	Literature	Consultation	Traffic Analysis	Safety Analysis
14.	Haugland Avenue at Kalum Street	Identified as a concern in the Safety Analysis (10/20) due to drivers not complying with the stop signs.				✓
15.	Park Avenue at Kenney Street	Identified as a concern in the Safety Analysis (16/20) due to drivers not complying with the stop signs.				✓
16.	Lakelse Avenue at Emerson Street	Identified as a concern in the Safety Analysis (19/20) due to drivers not observing the traffic signals.				✓
17.	Lakelse Avenue at Apsley Street	Identified as a concern in the Safety Analysis (14/20) due to issues and rear ends at the eastern gateway to the Downtown.				✓
18.	Straume Avenue at Kalum Street	Identified as a concern in the Safety Analysis (20/20) due to rear end collisions.				✓
19.	Haugland Avenue at Cassie Hall School	Pedestrian safety is a concern on Haugland Avenue near the Cassie Hall School.		✓		
20.	Halliwell Avenue at Sparks Street	Safety concerns identified by public/stakeholders, especially concerning the three-way stop control at the four-leg intersection. This is not a typical configuration, as it is more intuitive to drivers to see similar traffic control conditions on opposing approaches.		✓	✓	
21.	Lazelle Avenue at Sparks Street	Identified as a concern in the Safety Analysis (18/20) due to issues with right turning movements.				✓
22.	Lazelle Avenue at Kenney Street	Increasing traffic on Lanfear Drive will drive the warrant for turning lane improvements at this intersection.			✓	
23.	Park Avenue at Sparks Street	The offset T intersection creates concerns with geometry, pedestrian safety and traffic control.		✓	✓	
24..	Trail Connection To Thornhill	An improved pedestrian/cycle path to Thornhill is desired, which would require accommodating a trail connection on either the Skeena River (Highway 16) bridges and/or Old Skeena Bridge.	✓	✓		
25.	Lazelle Avenue at Emerson Street	Technical analysis suggests the traffic signal may not be warranted by existing and expected future traffic volumes.			✓	

8.3 PROVINCIAL HIGHWAY ISSUES

Table 35 outlines the issues identified with the provincial highways through Terrace, and the source(s). The provincial highway system is under the jurisdiction of MoTI, although the City is a key stakeholder and cost sharing partner on highway issues.

Table 34: Summary of Issues with Provincial Highways

No.	Location	Description of Issue(s)	Literature	Consultation	Traffic Analysis	Safety Analysis
1.	Hwy 16 (Keith Ave) at Sande Street	The upgrade to the traffic signal initially created some driver confusion, especially associated with the eastbound left turning movement. This has since been rectified with signage.	✓	✓	✓	✓
2.	Hwy 16 at Kenney Street	Identified as a concern in the Safety Analysis (1/20) due to trends in collisions associated with westbound left turns and northbound rear ends.		✓		✓
3.	Hwy 16 (Keith Ave) at Tetrault Street	Identified as a concern in the Safety Analysis (17/20). Left turn restrictions from Tetrault Street onto Highway 16 are not desired by some drivers, and illegal turns have caused collisions. There is also a trend in rear end collisions with westbound left turning traffic. Hospital access to and from Highway 16 is considered circuitous and problematic.		✓		✓
4.	Hwy 16 (Keith Ave) at Kalum Street	Identified as a concern in the Safety Analysis (3/20) due to a trend in collisions associated with westbound left turns. A westbound advance left turn phase was installed in 2016.				✓
5.	Hwy 16 at Eby Street	Identified as a concern in the Safety Analysis (12/20) due to a trend in rear end collisions. Also, the close proximity of the ambulance service access to the highway causes conflicts between southbound right turn drivers and ambulances attempting to enter the highway. The traffic signal does not have siren detection.		✓		✓
6.	Hwy 16 (Sande Street)	The existing Highway 16 (Sande Street) overpass has limited space for pedestrians and cyclists.	✓	✓		✓
7.	Hwy 16 at Munroe Street	Identified as a concern in the Safety Analysis (7/20) due to a trend in collisions associated with the southbound left turns.				✓
8.	Hwy 16 (Sande Street) at Greig Avenue	Identified as a concern in the Safety Analysis (9/20) due to a trend in collisions associated with the westbound left turns and northbound rear ends.	✓	✓		✓
9.	Hwy 16 (Keith Ave) at Hall Street	Identified as a concern in the Safety Analysis (11/20) due to a trend in rear end collisions.				✓
10.	Hwy 16 (Keith Ave) at Kerr Road	Challenging truck movements due to the operations at the bulk fuel plant. Formalizing a north connection to the signal opposite Walmart may allow trucks to turn at the existing traffic signal.		✓		
11.	Hwy 16 at the Grand Trunk Pathway	More access to the Grand Trunk Trail across Highway 16 is desired by users, esp. around Kenney Street.		✓		
12.	Kalum Lake Road	A sidewalk on the highway is desired to improve pedestrian safety.		✓		

8.4 GENERAL ISSUES

Table 36 outlines the general issues identified with the Terrace transportation system, and the source(s). These are systemic concerns about the system as a whole.

Table 35: Summary of General Issues

No.	Description of Issue(s)	Literature	Consultation	Traffic Analysis	Safety Analysis
1.	There is a strong desire by the public to make Terrace more safe and accessible for active transportation, such as walking and cycling, especially Downtown. This includes more sidewalks, bike lanes, and trails, including formal bike lanes on Park Avenue and Kalum Street. Bike lanes should be more offset from roadways where possible.	✓	✓	✓	✓
2.	The existing traffic control (i.e. signs, signals, etc) is confusing to some users, and occasionally is difficult to see due to obstructions.		✓		
3.	Terrace should be designed for accessibility, including flatter sidewalk crossfalls, fewer obstacles, wheelchair ramps at crosswalks and audible signals at traffic signals.		✓		
4.	There is a desire by the public to revisit the transit system to improve service and convenience. More handyDart service is desired, as well as a route to the airport.		✓		
5.	A designated truck route is necessary to facilitate truck movements within and through Terrace.	✓	✓	✓	✓
6.	More parking is desired Downtown, especially accessible parking (with signing).	✓	✓		
7.	Traffic speeds are a concern in Terrace; traffic calming measures are desired.		✓	✓	✓
8.	Lane markings are not durable, and cause concerns with safety and traffic guidance.		✓		
9.	More winter maintenance (esp. on transit routes) and spring street sweeping activities are desired.		✓		✓
10.	The existing pavement condition was felt to be in need of improvement by the some members of the public.		✓		
11.	Wayfinding signage is needed to promote guidance, sustainability and accessibility.	✓	✓		
12.	The road functional classification can be updated to incorporate the recommendations from the Transportation Master Plan.			✓	
13.	Approximately half of all reported collisions in Terrace are associated with parking manoeuvres.				✓
14.	More street lighting is desired to improve safety and security at night.		✓		
15.	Many motorists, pedestrians and cyclists do not appear to understand the rules of the road.		✓		✓

9 OPTIONS FOR IMPROVEMENT

9.1 GRADE-SEPARATED RAIL CROSSINGS

9.1.1 *New Overpass*

The 2009 Terrace Corridor Study (Ref. 3) identified three crossing alternatives for a second grade-separated rail overpass at Highway 16: Kalum Lake Road, Kenney Street, and Brooks Street. The study concluded that all three were viable, with Kenney Street scoring best from a technical perspective. However, the public feedback indicated that a Kalum Lake Road was preferred by the users.

At the time the study was written, CN Rail was considering the closure of the Kenney Street at-grade crossing. Therefore, a Kenney Street overpass would simply replace and upgrade an existing rail crossing. As the Kenney Street crossing is no longer being considered for closure, an alternate location for the overpass should be considered in order to increase the available traffic capacity across the tracks, and improve the connectivity between the north and south halves of the city.

The Kalum Lake Road intersection (Figure 96) is an ideal location for a rail overpass from a number of perspectives:

1. The location is 800 metres from the signalized intersections at Kenney Street (to the east) and Frank Street (to the west), which achieves an appropriate spacing for traffic signals along an arterial highway corridor.
2. A crossing at Kalum Lake Road would provide a convenient alternative for westbound traffic turning south when Kenney Street is closed for train crossings.
3. As the overpass will necessarily become the future truck route, there is an advantage to connecting it directly to Kalum Lake Road, a provincial highway.
4. The topography for a rail crossing is advantageous at Kalum Lake Road.



Figure 96: Kalum Lake Intersection as Viewed from Braun Street

To achieve the elevation necessary for the rail crossing, the highway would have to be raised approximately 7 metres (Figure 97). This is a similar concept as what currently exists at the Sande Street overpass, which is considered to be working well.

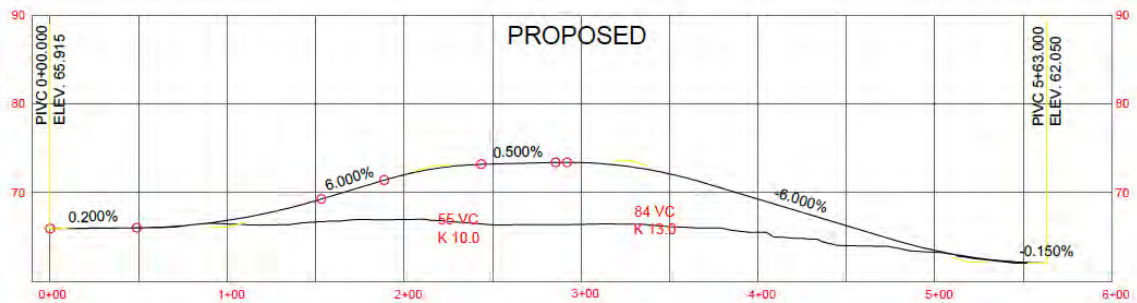
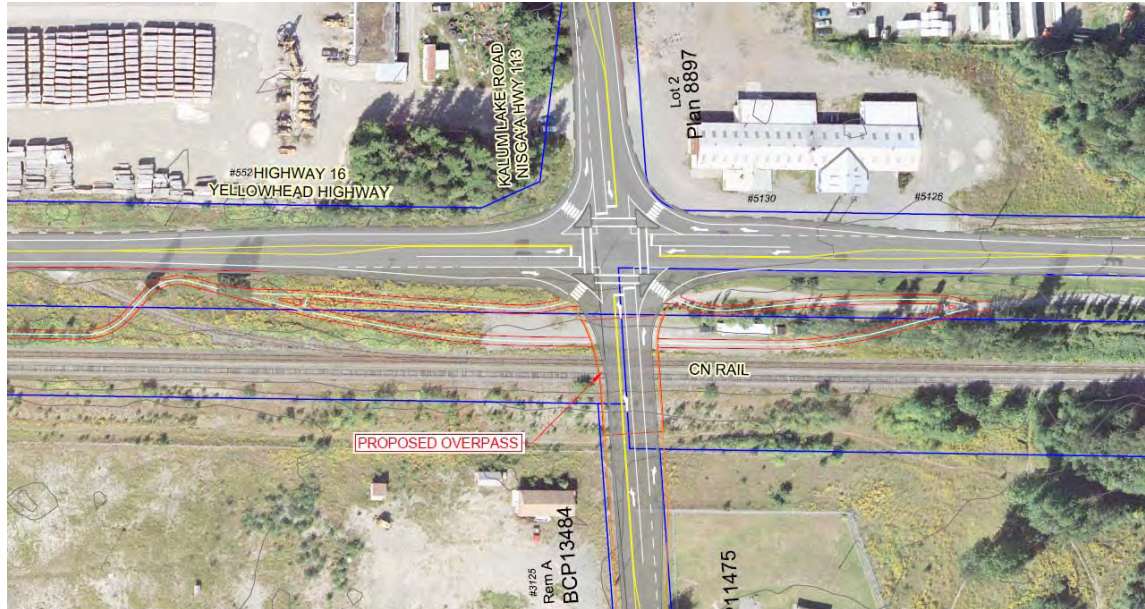


Figure 97: Conceptual Design of Kalum Lake Road Overpass

The new overpass and intersection must inherently be designed for the safe and accessible accommodation of pedestrians and cyclists. To maintain the continuity of the Grand Trunk Pathway, the trail should extend under the overpass, and also connect directly to the intersection. This would therefore provide the additional access to the trail that was requested by the public.

The cost of this improvement was estimated in the Infrastructure Upgrade Scoping Study (Ref. 12) to be approximately \$27 Million.

9.1.2 Pedestrian Crossing

One of the critical transportation issues in Terrace is the need for a new pedestrian crossing of the CN rail line. The demand to connect the neighbourhoods on either side of the tracks is well-established, and recent incidents have underscored the extreme safety issues associated with pedestrians crossing the rail yard at grade.

The pedestrian desire line was noted by the public and stakeholders to be strongest at Kalum Street. A pedestrian/cyclist overpass was also proposed at this location in the Active Transportation Plan (Ref. 10). The concern with this location is that it crosses 14 rail lines at the widest point in the CN yard. Assuming that CN would agree to a bridge crossing through the centre of their yard, the bridge would have to be a clear span of approximately 100 metres, as there is no space available for bridge piers. A planning-level cost estimate for such a structure, with the necessary lighting, railings, and accessible bridge approaches, is approximately \$10 to \$15 Million (based on the costs of other pedestrian bridges in western Canada of comparable length).

A more cost effective alternative at Kalum Street would be a gondola system, which could be designed to automatically shuttle pedestrians and cyclists from ground level to ground level, and crossing the tracks at a clearance of 11 metres (see example, Figure 98). The typical speed for such an installation would be 3 m/s, making a crossing approximately 2 minutes in duration. These facilities are commonly used for active transportation connections outside North America. The cost is estimated at \$3-4 Million for construction, with an estimated annual operating cost of \$50k.



Figure 98: Pedestrian Gondolas, Washington, DC
(source: wtop.com)

A more conventional alternative for a grade-separated crossing of the CN tracks is an overpass where the crossing distance is manageable. At the east end of the CN yard, the tracks converge into 2-3 lines. An overpass at this location would be approximately \$2 Million to construct. The benefit of this location is the opportunity to connect to the rest of the trail network, specifically the riverfront trails (existing and proposed), the proposed Highway 16 underpass, and the Lakelse Avenue trail to the Old Skeena Bridge (Figure 99). A new trail along the north side of the tracks could be constructed to connect the overpass to Kalum Street and the Millennium (Grand Trunk) Pathway system.

For pedestrians on Kalum Street traveling to and from the retail stores at the east end of the city, the walking distance to an overpass at the east end of the CN yard would be approximately 400 metres (i.e. the equivalent of four city blocks) longer than a trip directly through the CN yard. This improvement is therefore recommended. Secure fencing along the CN yard should be installed as part of this project to prevent any further at grade crossings of the rail lines.

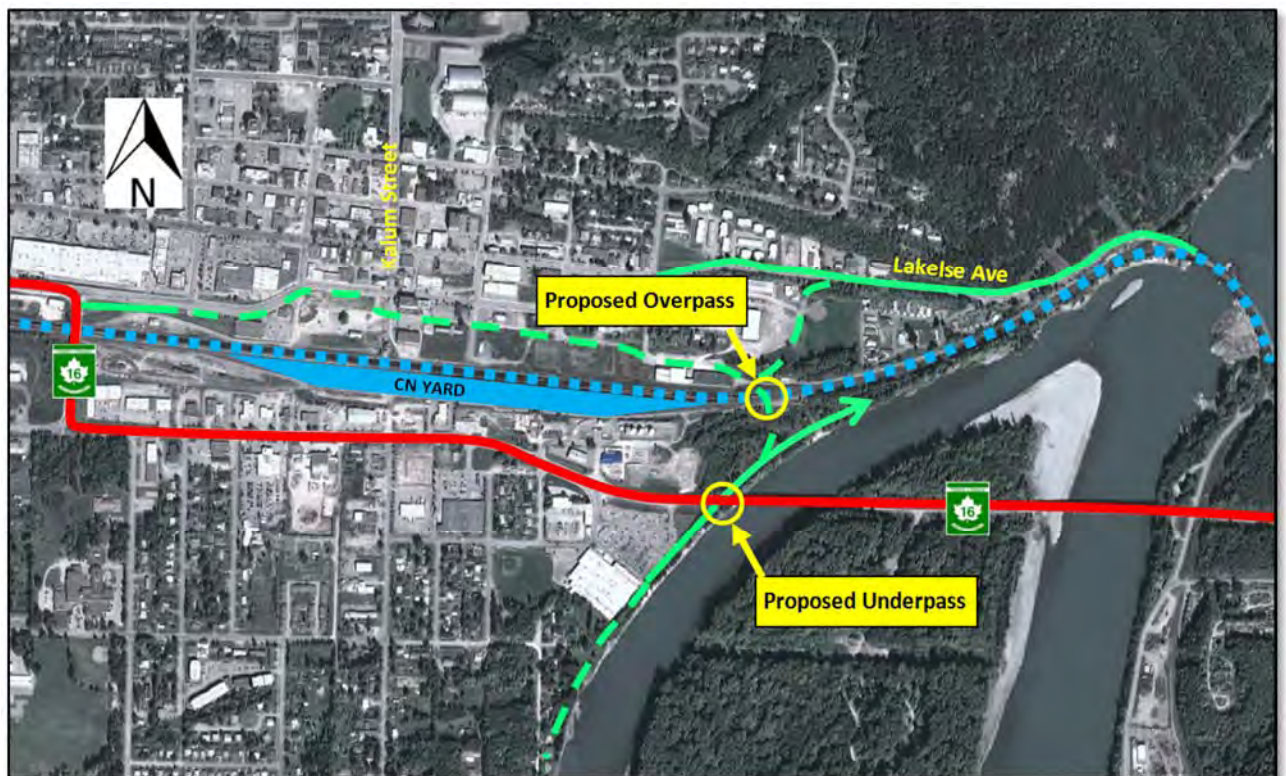


Figure 99: Recommended Location for a Pedestrian/Cyclist Overpass

9.2 CITY TRANSPORTATION CORRIDORS

9.2.1 Lanfeear Drive and Skeenaview Drive

Both Lanfeear Drive and Skeenaview Drive are classified as arterial roads, and connect the City Centre to the Upper Bench. However, the roads are generally less than 8 metres wide, and have steep grades and windy alignments. Adjacent pedestrians on narrow sidewalks exacerbate the safety concerns.

As the population grows, traffic is expected to increase significantly on these roads (especially Lanfeear Drive). In the absence of any alternative routes, these roads must be widened and upgraded. A 10.0 metre paved road width with an adjacent sidewalk would satisfy the safety requirements for traffic, pedestrians and cyclists, and would help accommodate the expected traffic demand.

A typical cross section for Lanfeear Drive (which would be similar to Skeenaview Drive) is shown in Figure 100. The cost of the Lanfeear Drive widening was estimated at \$5 Million. The cost of the Skeenaview Drive widening was estimated at \$8 Million (Ref. 12). The Lanfeear Drive improvements should be implemented first, due to its expected traffic demand. A conceptual design for Lanfeear Drive is provided in Appendix D.

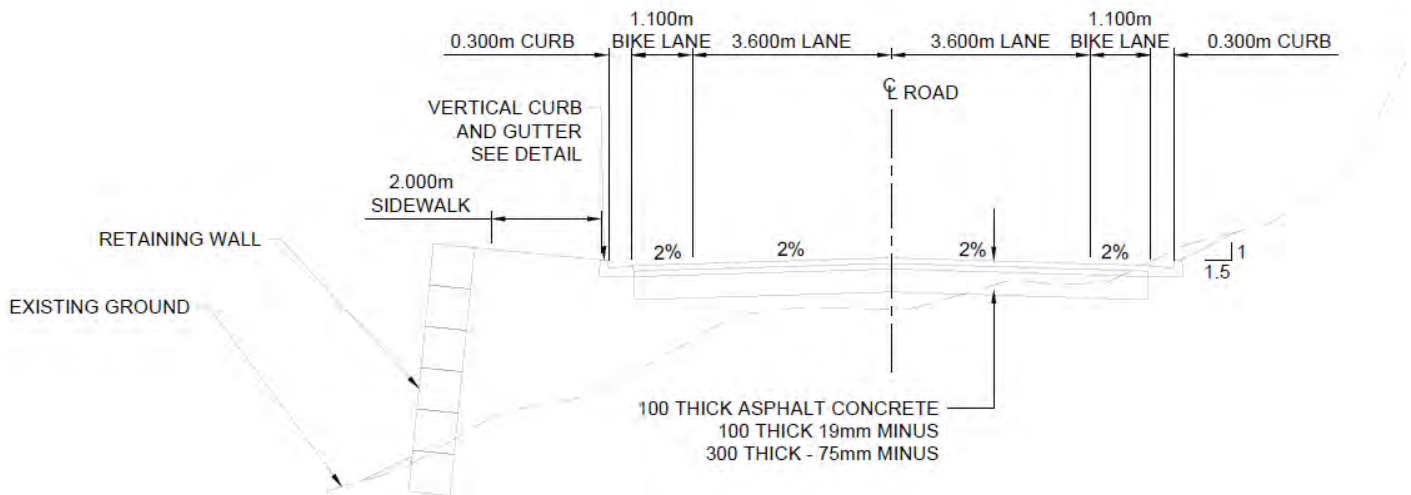


Figure 100: Proposed 10 metre Cross Section, Lanfeear Drive

9.2.2 *Keith Avenue*

As part of the future designated truck route (see analysis, Section 5.7), and as a major collector serving the proposed Keith Estates, Keith Avenue will require significant widening and upgrading, including provisions for pedestrians and cyclists.

A 24 metre right-of-way is recommended, with either of the cross sections shown in Figure 38. Both cross sections are based on a 14.6 metre road width (curb-to-curb). Option B aligns more closely with the recommendations from the Keith Estates Neighbourhood Concept Plan (Ref. 19) by including a 3.0 metre multi-use trail along the north side of the road.

Only the section between Highway 16 (Sande Street) and Braun Street is expected to require upgrading within the foreseeable future due to its expected future designation as a formal truck route. Between Sande Street and Kenney Street, the existing 9-12 metre width will require significant upgrading. The existing ~14 metre wide section between Kenney Street and Braun Street could accommodate the proposed road laning with small adjustments to the widths of the bike lanes and Two Way Left Turn Lane widths, so a formal upgrade of this section could be delayed to a later date.

The improvements to Keith Avenue should be coordinated with the left turn lane improvements recommended at the Keith Avenue / Kenney Street intersection (Section 9.7.1).

9.2.3 *Park Avenue*

Park Avenue is classified as a collector. However, there are two sections of Park Avenue that are discontinuous. The section between Eby Street and Munroe Street is the most important from a network perspective, especially since this link would become the main route between Lanfear Drive and the Downtown.

The section of Park Avenue between Lanfear Drive and Kalum Lake Hill is desirable, but is not likely to have the traffic demand to warrant the cost of the extension for the foreseeable future.

As Park Avenue is a designated cycle route, bike lanes or other cycle accommodation should be considered, especially through the Downtown.

9.2.4 *Lakelse Avenue*

A lane diet should be implemented on Lakelse Avenue, between Eby Street and Emerson Street, and between Kalum Street and Clinton Street. The traffic volumes do not require the four lanes provided, and the extra width will improve safety for parking and vulnerable road users. The Two-Way Left Turn Lane will also improve safety and road capacity by removing left turn conflicts from the traffic stream.

There are three design issues that must be considered in the implementation of the proposed Lakelse lane diet:

1. The transitions to the two lane section between Emerson Street and Kalum Street will need to be designed to ensure traffic can flow smoothly between the different blocks;
2. The on-street parking on the north side of Lakelse, east of the Tim Hortons, will have to be removed to ensure any queuing issues from the drive through do not impact westbound traffic on Lakelse Avenue; and
3. Two of the busiest accesses on Lakelse Avenue are to the Tim Hortons and the Safeway Parking Lot. The locations of these opposing accesses would create an overlap in left turns. The placement of these accesses will need to be studied to ensure head-on conflicts are not created in the Two Way Left Turn Lane.

9.2.5 *Kalum Street*

The existing lane diet on Kalum Street ends at Park Avenue. Both the existing and forecast future volumes are expected to be manageable with two lanes and a Two Way Left Turn Lane. The collision history at the Kalum Street intersections south of Park Avenue appears to suggest that safety could be improved with a lane diet. Therefore, the lane diet on Kalum Street should be extended south to Greig Avenue.

As Kalum Street is a designated cycle route, bike lanes or other cycle accommodation should be considered, especially through the Downtown.

9.2.6 *Haugland Avenue at Cassie Hall School*

To address the concerns with pedestrian safety, the design of the sidewalks and crosswalks in the neighbourhood should be reviewed in the context of providing safe routes to school.

9.2.7 *Trail Connection to Thornhill*

The trail connections to Thornhill should be improved on either the Old Skeena Bridge and/or the new Skeena Bridge on Highway 16. The Old Skeena Bridge connection is recommended due to the lower traffic volumes and speeds, the one-way traffic, and the existing separated path.

9.3 CITY INTERSECTIONS

The following options are proposed for addressing the city intersections outlined in Table 34.

9.3.1 Keith Avenue at Kenney Street

The recent collision history and current traffic patterns at the Keith Avenue / Kenney Street intersection (ranked 2/20 in the Network Screening) warrant the installation of a four way stop. The traffic will also require turning lane improvements in the future to safely accommodate the demand. This should be done in advance (but in consideration) of the future upgrade of Keith Avenue.

9.3.2 Lakelse Avenue at Sparks Street

The existing offset T intersection at the Lakelse Avenue / Sparks Street intersection (ranked 15/20 in the Network Screening) causes safety issues and traffic delays. The expected increase in traffic volumes is expected to exacerbate these concerns. The only apparent opportunity to align the two approaches on Sparks Street is to realign the south leg of the intersection through the adjacent property (Figure 101). This improvement is expected to cost in the order of \$800,000, not including property acquisition.

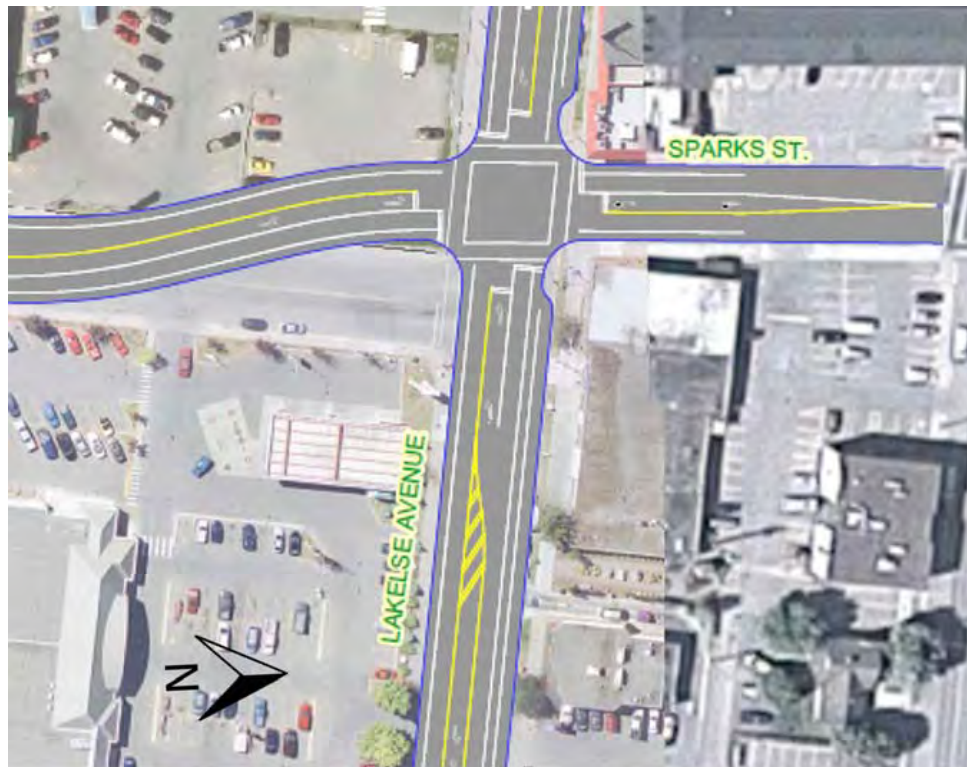


Figure 101: Proposed Realignment of Sparks Street at Lakelse Avenue

9.3.3 Lakelse Avenue at Eby Street

The existing traffic control at the Lakelse Avenue / Eby Street intersection was frequently identified as a concern, but did not translate into a trend in collisions (and was not included in the Top 20 intersections identified in the Network Screening). However, this intersection should be upgraded, especially to accommodate the 2025 traffic volumes, under which the existing traffic control is expected to fail.

There are two identified alternatives for reconfiguring the intersection. The first is to realign Lakelse Avenue to connect directly to the south leg of Eby Street (Figure 102). This option facilitates the connection between Highway 16 and Downtown, but does not address the significant traffic flow on Eby Street. Therefore, this option was not pursued further.



Figure 102: Potential Realignment at Lakelse Avenue and Eby Street

As the traffic volumes approach the warrants for a traffic signal (expected within 10 years), the intersection traffic pattern could be accommodated with a traffic signal, which would cost in the order of \$150,000.

Another alternative would be a roundabout, which would create a safe and aesthetic gateway to the Downtown. However, a roundabout would enable vehicles to enter and leave the intersection in a continuous stream. This would adversely affect traffic movements at the Lazelle Avenue / Eby Street intersection, approximately 50 metres north. A roundabout at Lakelse Avenue may necessitate movement restrictions at Lazelle Avenue, which would increase the importance of the Park Avenue connector.

9.3.4 Thomas Street at McConnell Avenue / Cooper Drive

Although the intersection of Thomas Street / McConnell Avenue / Cooper Drive was not one of the Top 20 collision prone intersections, it is the subject of concerns due to traffic demand in the peak hours (especially the morning). The offset “T” configuration in particular impedes traffic flow. The McConnell Avenue (eastbound) approach could be realigned to the north to create a four-leg intersection. However, this would only address the intersection geometric issues.

A roundabout is the recommended alternative. This could resolve the geometric issues, while also facilitating safe traffic flows with reduced delays. The nature of the roundabout geometry would also act as a traffic calming device to reduce traffic speeds, especially on Lanfear Drive. The traffic volumes are likely to meet the warrants for signalization as the Upper Bench develops. At that time, a roundabout should be constructed. The estimated cost is \$500,000.

A right turn lane would reduce the delays on the eastbound approach by facilitating right turns around left turning vehicles. However, this is only expected to save a few seconds delay per vehicle on average in the current peak hours, and would likely be discarded infrastructure when the intersection is upgraded. Depending on the timing of a major upgrade, a right turn lane may not be worthwhile.

9.3.5 Lanfear Drive at Pheasant Street

The existing safety concern with Lanfear Drive traffic diverting through Pheasant Street was identified in the public open house. The concern is likely to worsen as traffic volumes increase, but has not yet caused the location to be identified in the Network Screening. By closing this intersection (at least to southbound entering traffic), the safety concern can be addressed. The volume of traffic using this intersection is not sufficient to create a concern as it diverts to other routes.

As an alternative, the traffic turning from Lanfear Drive onto Pheasant Street could be slowed by the installation of an intersection bulb (Figure 103). This improvement would reduce traffic speeds at the intersection without eliminating the turning movement, and would also improve the safety of the intersection for pedestrians. The intersection bulb would have to be designed to accommodate the turning vehicles without overlapping the path of northbound traffic, such that the potential for southbound rear end conflicts on Lanfear Drive is minimized. Also, this solution would not necessarily prevent speeding traffic short-cutting through Pheasant Street after negotiating the turn at the intersection.



Figure 103: Potential Bulb on Pheasant Street at Lanfear Drive

Regardless of the improvement at the intersection, the safety of crossing pedestrians at the bottom of Lanfear Hill (especially at the trail) should be improved with a signed and marked crosswalk and pedestrian-activated flashing beacons. The location of the crosswalk should be sufficiently in alignment with the trails to be used by pedestrians and cyclists, while also being sufficiently set back from the Lanfear Drive hill to maximize the available sight distance.

9.3.6 *Park Avenue at Kalum Street*

The existing traffic signals at the Park Avenue / Kalum Street intersection (ranked 5/20 in the Network Screening) should be upgraded with higher intensity LED bulbs and reflective yellow backboards. This may be a candidate for cost sharing with ICBC.

9.3.7 *Lakelse Avenue at Kalum Street*

The existing traffic signals at the Lakelse Avenue / Kalum Street intersection (ranked 8/20 in the Network Screening) should be upgraded with higher intensity LED bulbs and reflective yellow backboards. This may be a candidate for cost sharing with ICBC. The lane diets proposed on Kalum Street and Lakelse Avenue are expected to have a negligible effect on traffic delays at the intersection, while improving safety.

9.3.8 *Lazelle Avenue at Kalum Street*

The northeast corner of the two-way stop-controlled intersection of Lazelle Avenue and Kalum Street (ranked 4/20 in the Network Screening) should have a sidewalk extension to improve the safety for pedestrians, and reduce the potential for rear end collisions.

9.3.9 *Scott Avenue at Eby Street*

The visibility of the stop conditions on Scott Avenue at the Eby Street intersection (ranked 6/20 in the Network Screening) should be improved by relocating the westbound stop sign closer to the road, ensuring the stop signs are made of micro-prismatic reflective sheeting, adding a westbound stop line, and adding reflective tape to the stop sign posts.

9.3.10 *Skeenaview Drive at Munthe Avenue*

The existing intersection appears to be operating well, with no collisions within the study period attributable to the limited sight lines looking down the hill. The convex mirror installed at the intersection appears to be compensating for the limited sight lines. However, as traffic volumes grow on Skeenaview Drive, the available capacity at this intersection may decrease. The City should monitor this intersection to determine if and when the westbound left turn from Munthe Avenue onto Skeenaview Drive (Sparks Street) should be restricted.

9.3.11 Walsh Avenue at Eby Street

The visibility of the stop conditions on Walsh Avenue at the Eby Street intersection (ranked 13/20 in the Network Screening) should be improved by ensuring the stop signs are made of micro-prismatic reflective sheeting, adding a westbound stop line, and adding reflective tape to the stop sign posts.

9.3.12 Haugland Avenue at Kalum Street

The visibility of the stop conditions on Haugland Avenue at the Kalum Street intersection (ranked 10/20 in the Network Screening) should be improved by ensuring the stop signs are made of micro-prismatic reflective sheeting, adding stop lines, and adding reflective tape to the stop sign posts.

9.3.13 Park Avenue at Kenney Street

The visibility of the stop conditions on Park Avenue at the Kenney Street intersection (ranked 16/20 in the Network Screening) should be improved by ensuring the stop signs are made of micro-prismatic reflective sheeting, adding stop lines, and adding reflective tape to the stop sign posts.

9.3.14 Lakelse Avenue at Emerson Street

The existing traffic signals at the Lakesle Avenue / Emerson Street intersection (ranked 19/20 in the Network Screening) should be upgraded to higher intensity LED bulbs and reflective yellow backboards. This may be a candidate for cost sharing with ICBC.

9.3.15 Lakelse Avenue at Apsley Street

The visibility of the stop conditions on Apsley Street at the Lakelse Avenue intersection (ranked 14/20 in the Network Screening) should be improved by ensuring the stop signs are made of micro-prismatic reflective sheeting, adding stop lines, and adding reflective tape to the stop sign posts.

9.3.16 Straume Avenue at Kalum Street

To improve the safety of the intersection of Straume Avenue at Kalum Street (ranked 20/20 in the Network Screening), the crosswalk on the south side of the intersection should be upgraded with standard signage.

9.3.17 Halliwell Avenue at Sparks Street

The safety concerns associated with the atypical three way stop condition at the four leg intersection can be addressed by upgrading the traffic control. Ideally, depending on the traffic volumes, the intersection should either be a two-way stop, or a four-way stop. If traffic is predominantly turning between two legs of the intersection, the geometry can be upgraded to recognize that as the primary movement.

9.3.18 *Lazelle Avenue at Sparks Street*

To prevent future sideswipes from concurrent right turn movements at the intersection of Lazelle Avenue and Sparks Street (ranked 18/20 in the Network Screening), a short right turn lane could be painted where width permits.

9.3.19 *Lazelle Avenue at Kenney Street*

A southbound left turn lane may be required to accommodate the turning demand in the future. If Park Avenue becomes the official route to the Downtown and/or if there are movement restrictions implemented at the intersection of Lazelle Avenue and Eby Street), the southbound left turn lane may be warranted at the Park Avenue intersection instead.

9.3.20 *Park Avenue at Sparks Street*

Park Avenue is functionally classified as a collector, and (with extensions implemented to the west) will become a key route to and from the Downtown. At the Sparks Street intersection, an offset T configuration creates awkward turning movements, and may have safety concerns under heavier traffic flows. In particular, the nature of the offset “T” configuration is such that opposing left turns on Sparks Street would overlap. The intersection should be realigned to create one four leg intersection (Figure 104).



Figure 104: Proposed Realignment of Park Avenue at Sparks Street

9.3.21 *Lazelle Avenue at Emerson Street*

The traffic signal does not appear warranted, and may be a candidate for removal. More study is required.

9.4 PROVINCIAL HIGHWAYS

The provincial highways fall under the jurisdiction of MoTI. However, the City is a key stakeholder and often funding partner for highway improvements. The following proposed recommendations should be submitted to MoTI for review and consideration. Those recommendations identified by the Safety Analysis may be candidates for ICBC funding.

1. The traffic signals along the Highway 16 corridor should be checked to ensure they meet current MoTI standards for visibility.
2. At the intersection of Highway 16 and Kenney Street (ranked 1/20 in the Network Screening), the installation of a red light camera could be considered for eastbound traffic. North and southbound left turn lanes will be warranted in future.
3. At the intersection of Highway 16 (Keith Avenue) and Kalum Street (ranked 3/20 in the Network Screening), a new westbound advance left turn phase, and the resolution of the queuing issues at the Tim Horton's drive-thru have likely helped reduce the potential for rear-end collisions. The addition of left turn lanes on the highway would also be beneficial, but would be costly in the narrow right-of-way.
4. Adequate sight lines should be maintained at the intersection of Highway 16 and Munroe Street (ranked 7/20 in the Network Screening).
5. A median island could be constructed on the eastbound approach to the intersection of Highway 16 (Sande Street) at Greig Avenue (ranked 9/20 in the Network Screening) to improve visibility for westbound drivers.
6. Left turn lanes at the intersection of Highway 16 (Keith Avenue) / Hall Street (ranked 11/20 in the Network Screening) would help reduce the potential for rear-end collisions. However, this would be costly in the narrow right-of-way.
7. Consideration should be given to installing emergency signal pre-emption with restricted southbound right turns for the ambulance service at the intersection of Highway 16 and Eby Street (ranked 12/20 in the Network Screening).
8. At the intersection of Highway 16 (Keith Avenue) and Tetrault Street (ranked 17/20 in the Network Screening), the primary hospital access should be relocated to the signalized intersection at Sande Street in order to reduce the turning conflicts at Tetrault Street. If the hospital route cannot be relocated, a westbound left turn lane should be considered at the Tetrault Street intersection.
9. The safety and comfort of pedestrians and cyclists on Sande Street should be improved as and where possible.
10. Truck movements from the bulk fuel plant should be improved, potentially at the Highway 16 / Kerr Street intersection.

The issue with the new signal at Highway 16 (Keith Avenue) and Sande Street was not included since MoTI is already addressing the recent increase in collisions.

9.5 GENERAL TRANSPORTATION SYSTEM

The list of general transportation system issues in Section 8.4 can be addressed as outlined below:

1. To improve the active transportation and accessibility in Terrace, the City should continue to implement the recommendations from the Active Transportation Study (Ref. 10), which has provided a prioritized list of future improvements.
2. To address issues with local traffic control, the Traffic Control Review jointly commissioned by the City and ICBC (in progress) will provide recommendations for adjusting local signage and paint markings to meet TAC guidelines.
3. To improve accessibility, the City should ensure new projects are free of barriers. Applicable accessibility standards should be incorporated into City bylaws.
4. To address concerns with the transit system, the City and BC Transit should jointly commission a comprehensive transit system review.
5. To manage and regulate truck traffic through Terrace, Keith Avenue and Braun Street should be officially designated as a truck route once Keith Avenue is upgraded and the overpass at Kalum Lake Road is constructed.
6. To address the concerns with Downtown parking, a formal parking study is required.
7. To reduce traffic speeds in local neighbourhoods, traffic calming measures should be implemented as and where applicable.
8. To improve the visibility of lane markings in Terrace, the City should install in-laid thermoplastic markings at strategic locations along the existing lane lines. These provide some traffic guidance when the paint is gone, and also facilitate layout.
9. To address concerns about snow removal and pavement condition, the City can ensure the public has access to the policies and strategies currently being used to guide operations.
10. To address concerns with Wayfinding, the Wayfinding Strategy (Ref. 4) should continue to be implemented.
11. To update the Road Functional Classification, the City can incorporate the recommendations from Section 5.1 into the Official Community Plan.
12. To address the large trend in parking-related collisions, revisit the parking design requirements for off-street parking in the Zoning Bylaw.
13. To address concerns with inadequate street lighting, the City could revisit street lighting strategies, and consider implementing Local Area Service programs. The collision analysis did not identify significant trends in collisions after dark.

10 IMPLEMENTATION PLAN

10.1 RECOMMENDED IMPROVEMENT PROGRAM

The recommended improvements identified in Section 9 are prioritized below for implementation.

10.1.1 Short Term (0-5 Year Horizon)

The following improvements should be implemented within the next five years.

1. Construct a new rail overpass on Highway 16 at Kalum Lake Road.
2. Construct a new pedestrian overpass at the east end of the CN yard, and upgrade the adjacent trail connections.
3. Widen Lanfear Drive to 10.0 metres (see conceptual design, Appendix D).
4. Upgrade the intersection of Keith Avenue at Kenney Street, including a four way stop (which should be implemented as soon as possible), and turning lanes (which should be implemented when funding permits).
5. Implement a lane diet on Lakelse, between Eby Street and Emerson Street, and between Kalum Street and Apsley Street.
6. Install a signed/marked crosswalk at the Howe Creek Trail crossing at the bottom of Lanfear Drive, with pedestrian-activated flashers.
7. Upgrade the existing traffic signals at the intersections of Park Avenue/Kalum Street, Lakelse Avenue/Kalum Street, and Lakelse Avenue/Emerson Street to higher intensity LED bulbs and reflective yellow backboards. Other signalized intersections should ideally be upgraded as well.
8. Upgrade the visibility of the stop conditions on the Scott Avenue approaches to Eby Street, the Walsh Avenue approaches to Eby Street, the Haugland Avenue approaches to Kalum Street, the Park Avenue approaches to Kenney Street, and the Apsley Street approaches to Lakelse Avenue.
9. Extend the existing lane diet on Kalum Street further south to Greig Avenue.
10. Upgrade the crosswalk signage on Kalum Street at Straume Avenue.
11. Review pedestrian network around Cassie Hall School on Haugland Avenue
12. Revisit the traffic control at Halliwell Avenue and Sparks Street
13. Consider painting short right turn lanes at Lazelle Avenue and Sparks Street if the turning demand becomes a concern.

14. For issues with provincial highways, the City should discuss with MoTI the issues outlined in Section 9.7.

The locations of all proposed Short Term improvements are shown in Figure 105.

Regarding the general or systemic issues, the City should:

1. Continue to implement the recommendations from the Active Transportation Plan.
2. Implement the identified higher priority recommendations from the forthcoming Traffic Control Review.
3. Ensure all new projects and initiatives are free from barriers to accessibility.
4. Commission a comprehensive Transit System Review.
5. Designate Keith Avenue and Braun Street as the local truck route after Keith Avenue is upgraded, and the overpass at Kalum Lake Road is constructed.
6. Commission a comprehensive Downtown Parking Study.
7. Implement traffic calming measures as and where applicable.
8. Add small applications of in-laid thermoplastic on the lane lines.
9. Ensure the public has access to the operational policies and strategies.
10. Continue to implement the recommendations from the Wayfinding Strategy.
11. Incorporate the revised Road Functional Classification into the OCP.
12. Revisit the off-street parking design requirements in the City Zoning Bylaw.

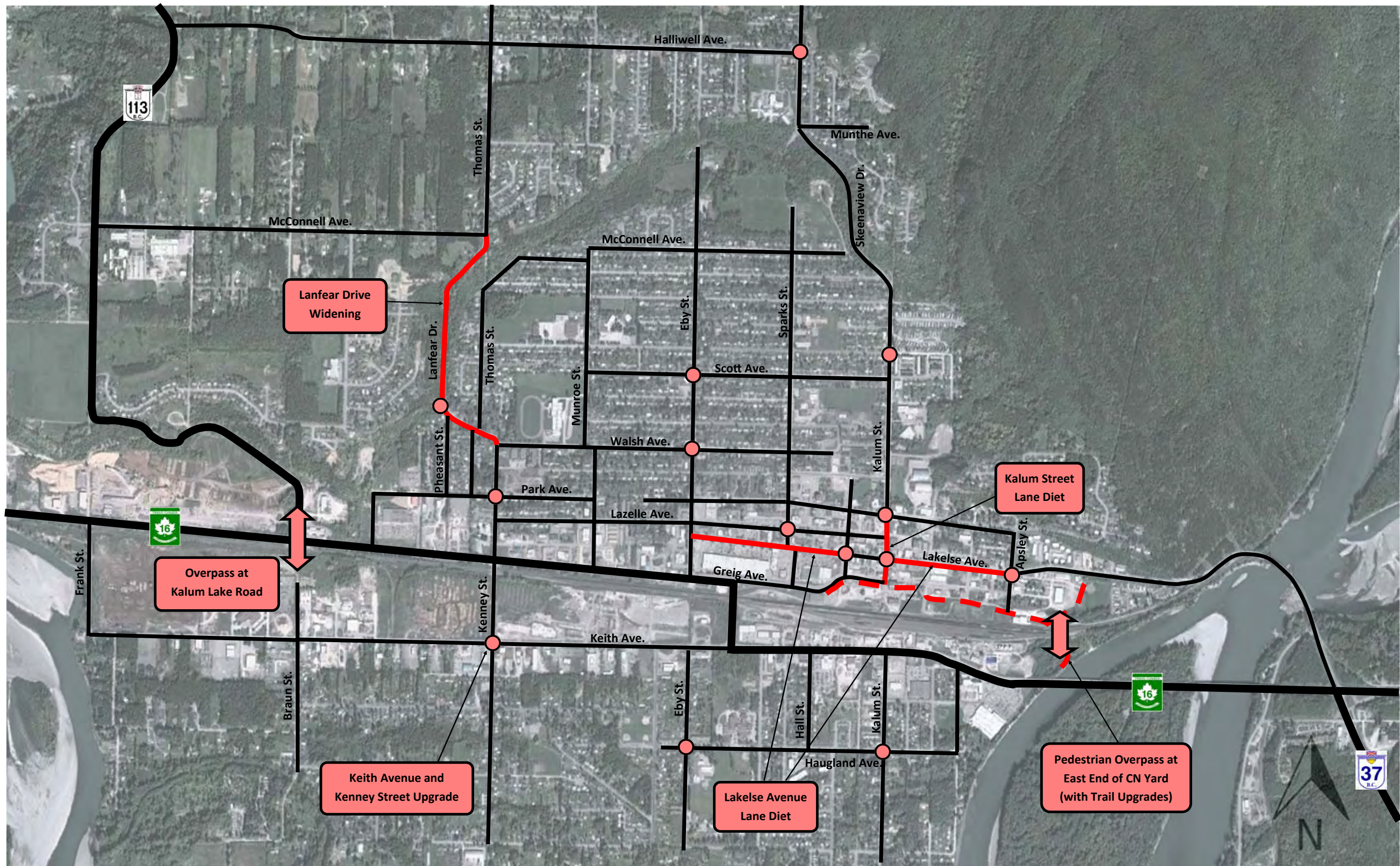


Figure 105: Short Term Improvements

10.1.2 *Medium Term (5-10 Year Horizon)*

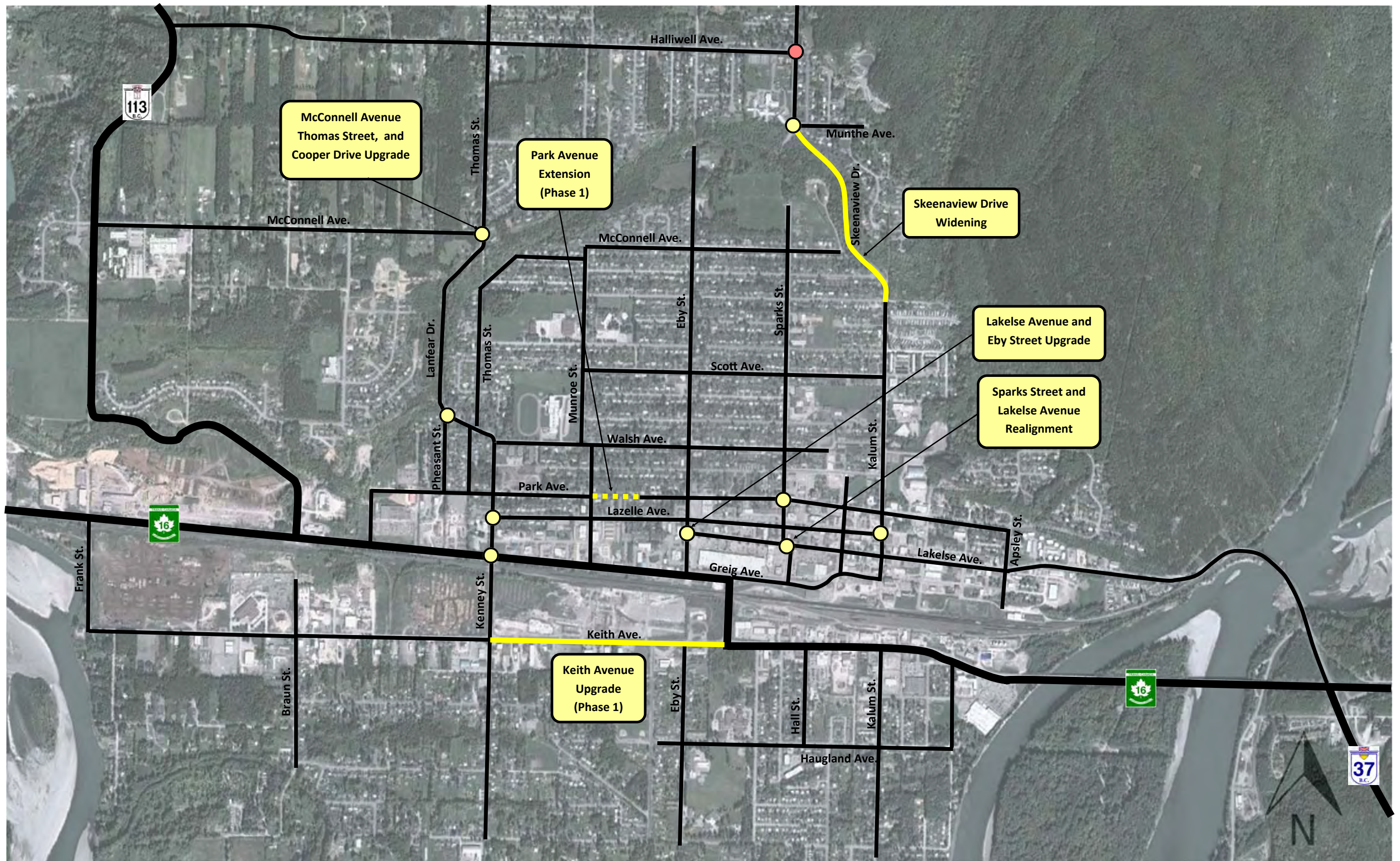
The following improvements should be implemented within the five to ten year horizon:

1. Widen Skeenaview Drive to 10.0 metres.
2. Widen and upgrade Keith Avenue between Highway 16 (Sande Street) and Kenney Street.
3. Extend Park Avenue between Eby Street and Munroe Street.
4. Realign Sparks Street at Lakelse Avenue
5. Install traffic signal or roundabout at the Lakelse Avenue / Eby Street intersection. If a roundabout, movement restrictions at the Lazelle Avenue / Eby Street intersection to the north will likely be required.
6. Construct a roundabout at the intersection of Thomas Street and McConnell Avenue / Cooper Drive.
7. Close the Pheasant Street intersection at Lanfear Drive, at least to southbound (entering) traffic. Northbound exiting movements can still be permitted if desired. As an alternative, the intersection could be narrowed to slow the speed of turning traffic; however, this is not expected to address the issue with short-cutting traffic, or the traffic speeds south of the intersection.
8. Install a sidewalk extension on the northeast corner of the Lazelle Avenue / Kalum Street intersection.
9. Monitor the performance of the Skeenaview Drive and Munthe Avenue intersection to determine if and when the westbound movements should be restricted.
10. Install a southbound left turn lane on Kenney Street at the Lazelle Avenue or Park Avenue intersection, depending on which has the main traffic flow to the Downtown.
11. Realign Park Avenue at the Sparks Street intersection.
12. Work with MoTI to install northbound and southbound left turn lanes at Highway 16 / Kenney Street to meet future traffic demand.

The locations of all proposed Medium Term improvements are shown in Figure 106.

Regarding the general or systemic issues, the City should:

1. Incorporate accessibility standards into the next revisions of the City bylaws.
2. Revisit the street lighting strategy as required.



McConnell Avenue
Thomas Street, and
Cooper Drive Upgrade

Park Avenue
Extension
(Phase 1)

Skeenaview Drive
Widening

Lakelse Avenue and
Eby Street Upgrade

Sparks Street and
Lakelse Avenue
Realignment

Keith Avenue
Upgrade
(Phase 1)

Figure 106: Medium Term Improvements



10.1.3 Long Term (10+ Year Horizon)

The following improvements can be delayed until past the 10 year horizon:

1. Upgrade Keith Avenue between Kenney Street and Braun Street.
2. Extend Park Avenue from Kalum Lake Road to Lanfear Drive
3. Improve the trail connections to Thornhill, especially via the Old Skeena Bridge.
4. Study the potential for removing the traffic signal at Lazelle Avenue at Emerson Street.

The locations of all proposed Long Term improvements are shown in Figure 107.

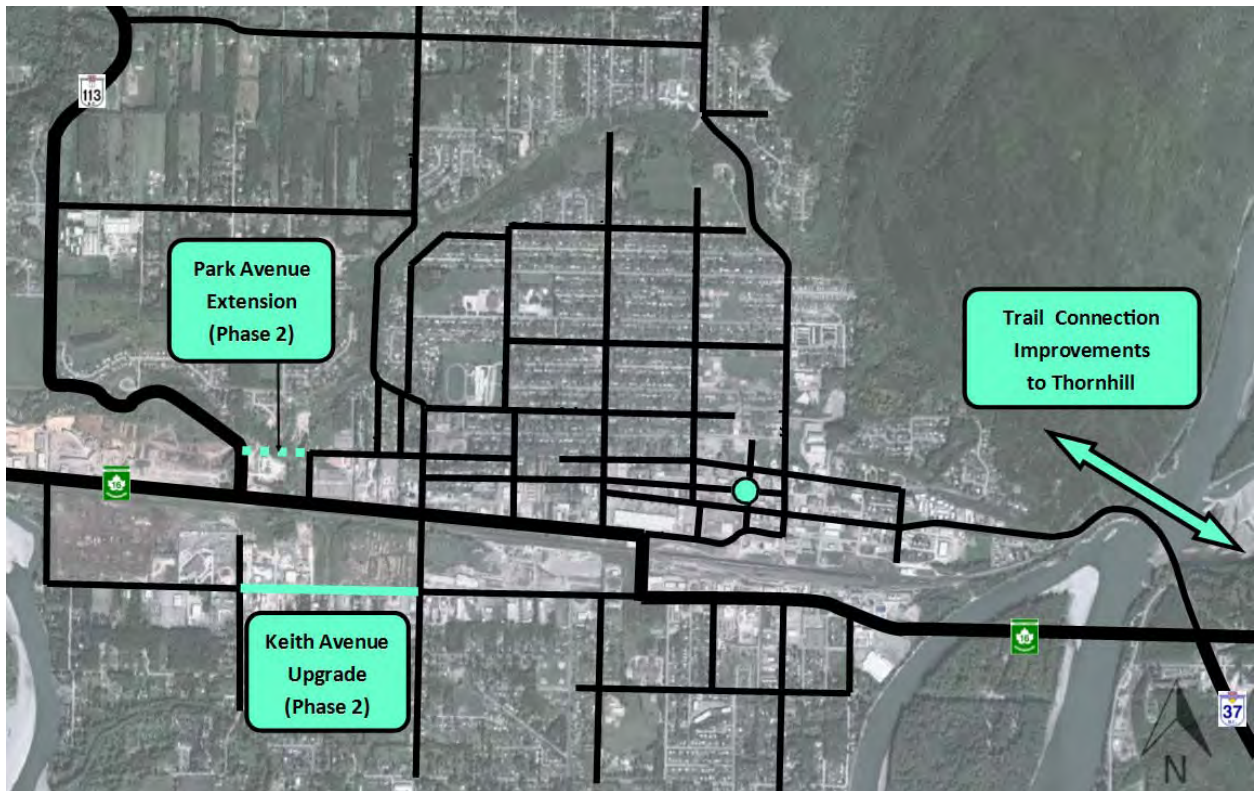


Figure 107: Long Term Improvements

10.2 TRAFFIC CALMING INITIATIVES

Traffic speeds are frequent concerns in communities. The severity of a pedestrian collision has been shown to increase dramatically with increases in vehicle speed (Figure 108).

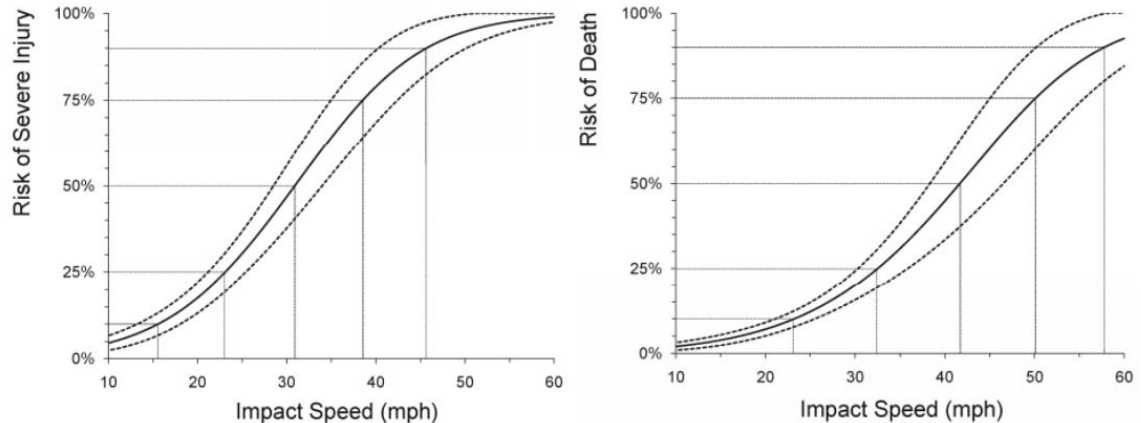


Figure 108: Pedestrian Collision Severity Versus Impact Speed

(source: AAA)

A number of traffic calming measures have been developed by the Transportation Association of Canada. However, these must be tailored to suit a northern climate, especially with the annual snowfall experienced by Terrace. The measures include:

1. **Vertical deflections:** the standard speed humps and raised crosswalks are effective at slowing vehicles in their vicinity. However, by virtue of being an obstacle in the roadway, these should be limited to local roads. Furthermore, as speed humps can be a hazard to snow ploughs, removable rubber speed humps should be used, such that they can be removed in the winter months. All speed humps require signage to alert drivers to their presence.
2. **Horizontal deflections:** among the more effective and aesthetic traffic calming measures are horizontal deflections, such as curb extensions (“sidewalk bulbs”), chicanes, and simple narrower roads. The reduction in the road width can be used to create more space for vulnerable road users and street-scaping, and may also reduce the amount of snow clearing required. Sidewalk bulbs have been used effectively throughout Downtown Terrace (Figure 109), and should be implemented wherever possible. To facilitate snow clearing around the bulbs, the bulbs should be developed with no more than a 30 degree angle from the original curb lines.
3. **On-street parking:** simply the provision of on-street parking can help reduce traffic speeds. However, the parking should be permitted in consideration of the need for unobstructed bicycle lanes, especially on the collector and arterial roads.





Figure 109: Sidewalk Bulb on Lakelse Avenue at Emerson Street

4. Intersection Treatments: local intersections with low traffic volumes could be candidates for traffic circles, which can be implemented by the placement of planters or other obstacles in the centre of the intersections. These can be problematic for truck turns, if present. A more common application is the modern roundabout, which can be applied to any class of street. These also slow traffic, but can accommodate large volumes of traffic and heavy truck movements, while significantly reducing the frequency and severity of collisions.
5. Speed Watch Campaigns: as an alternative to engineering and enforcement measures, the City or neighbourhood representatives can coordinate a formal Speed Watch campaign. These involve the installation of speed reader boards to monitor and display the speeds of passing traffic. The boards can be temporary installations with attendants, or can be permanently affixed to a pole at a problematic location.
6. Road closures: as a last resort, speeding issues (especially those associated with short-cutting through local neighbourhoods) can be addressed by restricting some or all movements at the entrance to the road. This may be a candidate solution at the intersection of Lanfeard Drive and Pheasant Street. To facilitate emergency response, a gate can be installed.

10.3 TRANSPORTATION DEMAND MANAGEMENT INITIATIVES

Transportation Demand Management (TDM) is the application of specific measures by a City to positively reduce or redistribute traffic demand. The target of these measures are often commuters in the peak hours.

The effective implementation of TDM measures can create numerous benefits for a city, including reducing traffic congestion, reducing greenhouse gas emissions, offsetting the need for major road and parking capacity improvements, and facilitating a healthier lifestyle for residents.

TDM initiatives are divided into two types:

- **Incentives** reward commuters for choosing the preferred travel behaviours. Typical incentives include subsidized bus fares, carpool programs, high occupancy vehicle lanes, and the provision of infrastructure and land use patterns that encourage healthy travel choices.
- **Disincentives** discourage commuters from choosing the non-preferred travel behaviours. Typical disincentives include parking fees, gasoline surcharges, congestion charges, bridge tolls, etc.

Many TDM measures are only effective in larger metropolitan centres. However, the City can implement a number of measures that manage transportation demand in the context of a relatively smaller northern city, such as:

1. Providing a strong pedestrian and cycle network.
2. Improving the transit service to attract ridership.
3. Continuing to densify and infill the existing city area, and discourage sprawl development.
4. Allowing developers to reduce their off-street parking requirements in exchange for accommodating trail and/or transit trips.



10.4 FURTHER STUDY

Some issues require further study to complete more detailed technical analysis, investigation, consultation, and evaluation, which would be outside the scope of the Transportation Master Plan. The additional studies recommended for consideration by the City are as follows:

1. Downtown Parking Study: the available parking in Downtown Terrace was listed frequently as a concern by the public and stakeholders. Furthermore, the Safety Analysis identified on-street parking conflicts as contributing to a trend in collisions. A study of the parking Downtown would allow the City to address current issues, and plan for the future parking demand as the population grows.
2. Transit Study: to improve the transit ridership, the current system should be studied in detail. The existing ridership should be considered in the context of existing and future origins and destinations. The study should also develop a plan for the on-street infrastructure, including a formal Downtown Transit Exchange.
3. Upper Bench Connector Study: a route study should be considered to determine if there are any remaining opportunities to construct new collector road(s) to the Upper Bench. The large amount of development expected in the north half of the city will create significant congestion on the existing routes.
4. Signal Warrants at Lazelle Avenue and Emerson Street: planning-level analysis suggests a signal may not be required at this location. A detailed study could be completed to determine if the signal is warranted by existing or future traffic demand, and what alternate traffic control may be more effective.

10.5 FUNDING INITIATIVES

There are significant costs associated with the identified transportation improvements. To ensure the priority projects receive the necessary funding for implementation, the following funding initiatives can be pursued.

1. Senior government grants frequently become available for projects that satisfy specific provincial and/or federal priorities at the time (e.g. economic stimulation, greenhouse gas reduction, etc). These grant programs often require shelf-ready designs. Therefore, as time permits, the City should pro-actively prepare designs for priority projects in anticipation of these grant programs.
2. Where a defined improvement to the roadway or traffic control can foreseeably reduce vehicle collisions, grants may be available through the Road Improvement Program (RIP) of the Insurance Corporation of British Columbia (ICBC). The Top 20 intersections identified in the Safety Analysis would generally be candidates for ICBC funding.
3. Pursuant to recent amendments to Section 906 of the Local Government Act, developers can contribute to the development of the City's Active Transportation System (either specific improvements, or a general fund) in lieu of constructing or paying a levy toward off-street parking facilities.
4. Proposed new sidewalk or lighting improvements which are not included in the City's Capital Plan can be funded by Local Area Service (LAS) agreements. Under these agreements, the City would pay for the improvement, and recover the cost from the adjacent property owner(s) through taxes over the following years. To generate more interest in this program, the City could contribute to LAS improvements in proportion to how much they benefit the transportation system.
5. The City can implement a Development Cost Charge Bylaw whereby developers would contribute to a fund to pay for major network improvements. The Bylaw would identify and provide estimated costs of the infrastructure. Then the developers would contribute to the fund in proportion to the magnitude of their developments.
6. Local corporations and businesses could sponsor some types of transportation infrastructure in exchange for naming rights and advertizing space, as currently occurs for the transit shelter and bench infrastructure.

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12 CLOSURE

This Transportation Master Plan has been prepared by McElhanney Consulting Services Ltd. (MCSL) for the benefit of the City of Terrace. The information and data contained herein represent MCSL's best professional judgment in light of the knowledge and information available to MCSL at the time of preparation.

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McELHANNEY CONSULTING SERVICES LTD

Prepared By:



V. Glenn Stanker, PEng, PTOE
Project Manager



Chris Houston, PEng
Project Engineer



Bernard Abelson, PEng, MEng, TOPS
Senior Technical Advisor



Paul Bjorn, PEng
Senior Project Advisor

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APPENDIX A

PROJECT TEAM MEETING MINUTES

Terrace Transportation Master Plan Project Initiation Meeting

Time: 9:00 am

Date: Wednesday, December 2, 2015

Location: Terrace Public Works Yard

Attendees:

Robert Schibli, Director of Public Works, City of Terrace
David Block, MCIP, RPP, Director of Development Services, City of Terrace
Chris Cordts, PEng, Engineering Supervisor, City of Terrace
Meghan Dusdal, ASCT, ROWP, Engineering Technologist, City of Terrace
Madelaine Peters, Planner 1, City of Terrace
Paul Bjorn, PEng, Branch Manager, McElhanney Consulting Services Ltd.
Bernard Abelson, PE, Transportation Planning Lead, McElhanney Consulting Services Ltd.
Jose Pinto, PEng, PTOE, Sr Transportation Engineer, McElhanney Consulting Services Ltd.
Chris Houston, PEng, Civil Engineering Division Manager, McElhanney Consulting Services Ltd.
Glenn Stanker, PEng, PTOE, Sr Transportation Engineer, McElhanney Consulting Services Ltd.

Minutes:

1. The impetus for the Transportation Master Plan is the large population growth expected in Terrace in the next ten years.
2. Data collection
 - City traffic counts: some local roads have been counted (tube and intersection), including the Sande overpass (provided at meeting). A couple recent hotel developments have traffic impact studies which also have data (provided at meeting).
 - MoTI has data from count stations along the highway, and also a study on the Sande intersection which could be made available.
 - Terrace has the complete collision data from ICBC available. Glenn to talk to ICBC about sharing the data for the purpose of this study.
 - Existing population data and growth projections for three scenarios were provided by the City. BC Stats numbers are questionable.
3. Background documents:
 - The City provided recent Active Transportation Plan and other documents.
 - The five year capital plan can also be provided.
 - The OCP is in progress, but some sections can be used. The TMP will be incorporated into the OCP, and to identify DCC projects.
 - McElhanney has base mapping for the GIS. Additional relevant GIS data (e.g. road functional classification, infrastructure, etc) can be available. McElhanney GIS staff to contact City mapping staff.
 - The highway corridor study by Boulevard has public comments in the Appendix.
4. There are two stakeholders meetings proposed in late January, as follows:
 - Meeting 1 – Agencies:
 - Ministry of Transportation and Infrastructure
 - RCMP
 - ICBC
 - School District
 - Ambulance Service
 - CN Rail
 - BC Transit
 - Northern Health Authority

- Meeting 2 – Users:
 - Chamber of Commerce
 - Terrace Downtown Improvement Association
 - First Nations
 - Keith Business Industrial Group (Steve Smythe/Sid Bandstra)
 - Truckers Association
 - BCAA
 - Taxi Companies
 - Terrace Cycling Club and/or TORCA
 - Seniors and Youth Associations
 - Disabled Community Representative(s)

- 5. Two Open Houses will be hosted. The first will be in late January to introduce the project and invite feedback and ideas. The second will be at the draft report delivery stage, following a Noon presentation to Council. The Open Houses will be advertised with a media release.

- 6. An online “SurveyMonkey” survey will be developed and released in late January to invite formal input into the study. The City has an account available. Input will also be solicited in other online media, including PlaceSpeak, Twitter, Facebook etc. McElhanney has experts available in PlaceSpeak. Links will be created on the City’s website. For those without an Internet connection, paper copies and phone numbers will be available.

- 7. Issues for Study:
 - The City’s existing road functional classification will be revisited by McElhanney.
 - Capacity for each road link will be calculated at a planning level, based on known laning and traffic control. This will facilitate comparison with the traffic volumes/demand on each link.
 - Existing road cross sections (provided by the City) will be reviewed and expanded for each road class. Road structure is not required. Only the widths are needed.
 - Downtown Street Review should consider “complete streets” and traffic calming measures, including (but not limited to) a lane diet. A recent lane diet on Kalum was successful.
 - Truck route analysis will include identification of key truck routes being used now, and in the future. The analysis will lead toward future Dangerous Goods Route planning.
 - Lanfear and Skeenaview have steep, tortuous geometry. McElhanney will review the alignment and cross sections, and collision data (if available) to identify short and long term opportunities to improve safety (esp. for pedestrians and cyclists). Improvements can be localized, or consider the greater network. Land ownership and steep sideslopes are issues on Lanfear. Retaining walls may be a solution. Future development must be considered. A one-way solution has been suggested, but would create network impacts elsewhere. Land to the south may allow for improvements to the grades. Improvements may qualify for BC Bike grants. McElhanney will donate the design for a stairway up the hill.
 - Lanfear/McConnell intersection is an offset “T” which causes safety concerns, esp. around school bell times.
 - Keith Avenue (West of Sande): Some preliminary cross sections have been proposed by development consultant. The mixed use commercial and high density residential will create traffic impacts in the area, and generate more pedestrian and cycling trips. These will conflict with Keith’s role as a major truck route. There is 20 metres of right-of-way available between Kenney and Sande; a widening plan may be necessary. West of Kenny, there are limitation on road widening, but there is not as much planned growth.
 - Grade separated crossings: The 2008 corridor study recommended Kenney Street for grade separation. But this impacts properties. CN is no longer asking for the upgrade of the at-grade rail crossing. Other locations should be considered (e.g. Kalum Lake Rd intersection, esp. with proposed extension of Park Ave).
 - A Pedestrian Overpass may be beneficial over the rail yard at the new Keith subdivision or at Kalum Street. Both locations (and others?) should be considered.



- Eby/Lakelse intersection has free flow traffic from the stem of the “T”, while other approaches stop. This intersection is a good candidate for a roundabout, esp. with the proposed lane diet on Lakelse. The solution should be considered in conjunction with the Lazelle/Eby intersection.
 - Lakelse/Sparks intersection suffers undue delays due to the three phase signal needed to accommodate the offset “T” intersection. There are also concerns with pedestrian crossings. The traffic delays cause queuing impacts to the Lazelle/Sparks intersection further north. A realignment (e.g. through the parking lot on the southwest corner) could create one four-leg intersection, and reduce delays with a simple two phase signal.
 - Another offset “T” intersection is Sparks/Park. This should also be reviewed. Pedestrians are the concern here also.
 - There is a blind corner at the top of Skeenaview. Although traffic is not heavy, this should also be reviewed.
 - The signals on Sande will eventually be synchronized by MoTI when warranted by volumes. The new hospital should be constructed to access the highway as the south leg to the Sande/Keith intersection.
8. The project delivery should be in June or July 2016.
9. Chris will be the prime City contact for the study.

/VGS



APPENDIX B

STAKEHOLDER CONSULTATION

Stakeholder Meeting No. 1: Government Agencies

Time: 9:00 to 11:00 am

Date: Wednesday, February 10th, 2016

Location: Terrace City Hall

Attendees:

- Rob Schibli, Director of Public Works, City of Terrace
- Chris Cordts, Engineering Supervisor, City of Terrace
- Meghan Dusdal, Design Technologist, City of Terrace
- Darrell Gunn, District Highways Manager, Skeena District, MoTI
- Adriana McMullen, BC Transit
- Eric Fenato, FirstCanada ULC
- Angela Rabut, Royal Canadian Mounted Police
- Cheryl Spencer, BC Ambulance
- Bernard Abelson, PEng, MEng, TOPS, Transportation Planning Lead, MCSL
- Glenn Stanker, PEng, PTOE, Senior Transportation Engineer, MCSL
- Chris Houston, PEng, Civil Engineering Manager, MCSL

Absent:

- David Dean, PEng, ICBC
- Katherine McIntosh, School District No. 82
- Norman Hart, CN Rail
- Chris Simms, Northern Health
- Kerry Clarke, Northwest Community College
- Phil Burton, UNBC

Minutes:

The purpose and scope of the Transportation Master Plan were presented to the group. The following issues and comments were recorded:

General Comments:

1. Intersection traffic control and configurations in Terrace are not considered to be consistent, e.g. stop vs. free flow, intersection spacing, staggered intersections.
2. BC Transit would like to see transit routes given priority for snow clearing.
3. The city is compact and well-planned, which is conducive to transit service. The grid system works well, but dead end streets can be a problem for emergency response. No Thru Road signs should be used where applicable.
4. The threshold for delay is lower in Terrace, as residents are accustomed to a higher level of service on local roads. This must be considered when establishing acceptable performance measures for the transportation system. At these locations, crash statistics should also be considered.
5. A growing concern is the accommodation of older drivers, and the use of scooters on the roads and sidewalks.
6. Some cities have way-finding signs with estimated walking times. This could be considered in Terrace to promote sustainable transportation, and improve accessibility.

7. Cycling in Terrace would likely increase with more facilities and improved network connections (e.g. Lanfear and Skeenaview).
8. BC Transit will share ridership data for Terrace.
9. Coffee shop drive-thrus often create queuing problems on the adjacent streets.

Specific Locations of Concern:

10. There are speeding concerns on McConnell Ave, Keith Ave, and Kenney St.
11. Highway 16 (Sande Street)/Keith Avenue: the recent signal upgrade has created a more logical and effective traffic control, but the public has been confused by the changes. Many drivers continue to turn eastbound left against oncoming traffic, forgetting the stop sign has been replaced with a signal. There have been approximately 12 collisions within the last three months. New signing should be considered.
12. Highway 16/Eby Street: the ambulance service is located at this intersection. The speed at which some drivers negotiate the southbound right turn onto the highway makes it difficult for ambulances to enter the highway. Restricting right turns on red may help ambulances enter the highway, but would dramatically reduce intersection capacity during the rest of the day. The intersection corner geometry could also be revisited to reduce traffic speeds. Four signals in Terrace have emergency vehicle siren detection, but Highway 16 / Eby Street is not one of them.
13. Lakesle Avenue / Sparks Street: the offset T intersection is a concern.
14. Skeenaview: the narrow, windy geometry is a problem for larger vehicles, including buses. A large rock recently fell off the hillside and dented the side of a bus on Skeenaview. However, the road is well-maintained. There is a lack of right-of-way available for improvements, and geotechnical constraints. The pedestrian/cycle path could potentially be relocated outside the corridor. Options are outlined in the City's Active Transportation Plan.
15. Lanfear Hill: has many of the same issues as Skeenaview. There are concerns with vehicle queuing on McConnell especially around school drop-off and pick-up times. The hill is posted at 40 km/h, but traffic speeds can be as high as 70 km/h. This causes additional delays at the McConnell Avenue / Cooper Drive intersection.
16. Kalum Street / Munthe Avenue: the limited sight distance is addressed with a mirror, which appears to be working well. Collision statistics should be checked.
17. Skeena Mall bus stop: a shelter has been provided, which is an important facility at this key stop. The two problems with the shelter are (a) non-riders often loiter inside, and (b) it occasionally gets wet inside. The RCMP can respond to the former issue. This location would be desirable for a future transit exchange.
18. Kenney Street / Keith Avenue: large intersection with heavy truck movements has potential sight distance issues, and growing levels of delay. The traffic volumes at the intersection have increased since the signal improvements on Sande Street. The size of the intersection also means that heavy vehicles require bigger gaps in traffic on Kenney Street in order to enter the intersection. There is a problem with drivers on Keith Avenue failing to observe the stop condition because they either mistake the intersection as a four-way stop, or they do not notice the stop sign (especially with this being the only stop condition on the corridor). A four way stop could be considered, but must not cause queuing across the rail tracks to the north. The future development of the Mill Lands will require this intersection to be addressed due to the expected increase in traffic.

19. Eby Street / Lakesle Avenue has atypical traffic control (i.e. free flow traffic from the stem of the T intersection), and experiences peak hour delays and queuing issues. A roundabout may be a potential solution, with its safety and aesthetic advantages. However, the laning and the spacing with Lazelle Avenue would have to be addressed. There are currently no roundabouts in Terrace, so education would be important.
20. Eby Street / Lazelle Avenue: the lane drop on Eby just north of this intersection causes northbound vehicles to move into the lane serving the left turn from Eby into Lazelle, prior to this intersection. This conflicts with traffic exiting Lakelse also making this left turn.

Grade-Separated Rail Crossings:

21. There were previous studies done by MoTI, the City and ICBC concerning possible locations for additional grade separations. These studies should be referenced. A second overpass is necessary particularly for emergency response.
22. Kalum Street: pedestrians are currently crossing the CN rail yard to travel between the Kalum neighbourhood residences and the businesses on the highway (especially Walmart). There is extreme danger involved, and there have been a few incidents in the past. This is the most desired location for a pedestrian overpass, but would be extremely expensive to build a clear span across multiple tracks. No pedestrian counts are available to determine the severity of this situation.
23. CN Rail previously wanted to close the at-grade rail crossing on Kenney Street, but it is an important network connection. This crossing continues to work well, although long train crossing delays cause some drivers to make U-Turns at the closed gates on Kenney to return to the Sande Street overpass.
24. From a network connectivity and redundancy perspective, Frank Street is too far west to be a viable grade-separated rail crossing.
25. The Kalum Lake Road / Braun Street intersection appears to be the preferred location for an overpass over the tracks, as identified in previous reports.

Downtown Terrace:

26. Kalum Street: the Two-Way Left Turn Lane has been a good improvement. The only concern is the south transition point, which can be confusing. The left lane moves right, but has right-of-way. These paint markings should be revisited. The City noted that this is only an interim measure.
27. Lakelse Avenue: there is a lot of activity around the Skeena Mall, including four lanes of traffic, frequent turning conflicts (especially at Tim Hortons), on-street parking, and a mid-block pedestrian crosswalk. Many pedestrians are not watching for traffic when they cross. A lane diet may improve the situation, if the volumes and left turn demand permit. Education is key. Improved overhead lighting, or pedestrian-activated flashing lights would help make this crossing safer.
28. Funding sources: There are no Development Cost Charges (DCCs) in Terrace, and implementing these as a revenue source to pay for infrastructure upgrades would likely discourage local development in favour of other cities. There are no communities with DCCs west of Prince George.
29. Lazelle Avenue and Lakelse Avenue could be developed as a one-way couplet, which would improve traffic flow and safety. However, traffic circulation and wayfinding downtown would be a little more challenging.

Stakeholder Meeting No. 2: User Groups

Time: 9:00 to 11:00 am

Date: Thursday, February 11th, 2016

Location: Terrace City Hall

Attendees:

- Rob Schibli, Director of Public Works, City of Terrace
- Chris Cordts, Engineering Supervisor, City of Terrace
- Meghan Dusdal, Design Technologist, City of Terrace
- Bryan Halbauer, Kalum Kabs
- Sid Bandstra, Bandstra Transportation
- Carole Julseth, Happy Gang Centre
- Ulyses Venegas, Kitselas Band
- Doug Ames, Northwest Fuels
- Chad France, TORCA
- Bernard Abelson, PEng, MEng, TOPS, Transportation Planning Lead, MCSL
- Glenn Stanker, PEng, PTOE, Senior Transportation Engineer, MCSL
- Chris Houston, PEng, Civil Engineering Manager, MCSL

Absent:

- Erika Magnuson-Ford, Chamber of Commerce
- Dennis Lissimore, Terrace Downtown Improvement Area
- Steve Roberts, Kitsumkalum Band
- Steve Smyth, Keith Business Industrial Group
- BCAA
- Alisa Thompson, Youth Advisory Committee
- Yvonne Neilson, Accessibility Advocate

Minutes:

The purpose and scope of the Transportation Master Plan were presented to the group. The following issues and comments were recorded:

General Comments:

1. To avoid the challenges on the hills to get to the top and bottom of the horseshoe, trucks also use Kalum Lake Road.

Specific Locations of Concern:

2. The Grand Trunk Pathway trail is well-designed and well-used. It should be extended if possible. An active transportation loop between the existing Sande Street Bridge and a possible future bridge at Braun Street was suggested.
3. Keith Avenue / Kenney Street appears to be a collision-prone location. The hydro pole in the northeast corner impedes sight lines. Any upgrades must ensure traffic does not queue across the tracks to the north.
4. Keith Avenue is a logical candidate for the designated truck route. A suggestion was to designate this route as Highway 16 and construct an overpass at Braun Street. This would reroute heavy and dangerous goods away from the downtown.

5. Highway 16 / Kerr Street (Big Bertha): challenging turning movements for trucks entering the highway from the bulk fuel plant, with restricted sight lines. A new route that makes use of the existing traffic signal at Walmart would be preferred, but must consider the existing traffic pattern in the plant (which has been configured to accommodate loading only in the eastbound direction). There is a road right-of-way designated opposite the Walmart access, however there is no construction timeline. This intersection is under MoTI jurisdiction.
6. The hydro poles along Highway 16 take space away from pedestrians on the sidewalk. It would be desirable to relocate or underground these lines.
7. Highway 16 (Sande Street) / Keith Avenue: the new signal works well, but is a concern as drivers are having trouble adapting (esp. eastbound left turns).
8. Skeenaview Drive and Lanfeer Drive have some extremely narrow sections. The widths are perceived to be narrower than they are due to the proximity of the sideslopes. Speed is a concern. One way traffic is a potential solution, but would affect network reliability/redundancy (i.e. when one hill is closed for maintenance or crashes, there would be no convenient alternatives).
9. There are pedestrian safety concerns at the bottom of Lanfeer Drive at the head of the Howe Creek Trail due to the curve in the road, vehicle speeds, and limited lighting at night.
10. The mirror on Skeenaview Drive at Munthe Avenue appears to work well. This may be a candidate solution on Lanfeer Hill as well. However, drivers on Lanfeer may focus on a mirror, and ignore other vehicle turning movements and pedestrians around them.
11. The offset T intersection at Lakelse Avenue / Sparks Street should be realigned, if possible, to create a four leg intersection. This will reduce traffic delays, but would be a costly improvement.
12. The four way stop at the Hwy 16 / Hwy 37 intersection is a concern, but is a MoTI issue and is outside of the scope of this study.
13. The City should consider a designated bike route on the Lakelse Avenue bridge crossing the Skeena River, rather than cyclists using the Highway 16 bridge.
14. A sidewalk on Kalum Lake Road is desirable. Although this is a Ministry highway, the City would likely be responsible for any sidewalk improvements.
15. The Eby Street / Lakelse intersection appears to work well for local residents who understand the traffic control.
16. An accessible parking space is requested at the Happy Gang Centre.
17. In general the trail networks between the top and bottom of the Horseshoe are good. However, the grades and surfaces are not accessible for strollers and wheelchairs.

Grade-Separated Rail Crossings:

18. Both at-grade rail crossings at Kenney Street and Frank Street are issues for large trucks.
19. The at-grade rail crossing at Kenney Street creates long delays when the trains are crossing. This is a problem for emergency services, which are therefore limited to the Sande Street Bridge. The emergency services and the hospital are located on opposite sides of the railway tracks.
20. An additional grade-separated crossing (e.g. at the Kalum Lake Road/Braun Street) is required in case the Sande Street Bridge is closed for an extended period. A grade-separated crossing at Braun Street will also promote development on the west side of Terrace, and accommodate the

Mill Lands development. Furthermore, a crossing at this location would tie into the Grand Trunk Pathway to achieve an active transportation loop.

21. The existing overpass on Sande Street should be improved for pedestrians and cyclists. There is poor connectivity for pedestrians at the south end of the bridge. Any new grade separations must accommodate pedestrians and bikes.
22. A new pedestrian overpass would ideally connect to the downtown area, and match the existing desire line. A new overpass should be complemented with fencing of the CN Yard for safety.

Downtown Terrace:

23. The Kalum Street lane diet improves visibility between the road and sidewalk. However, the configuration can create blind spots in the middle lane, especially at pedestrian crosswalks. The crossing distance is relatively long, and pedestrians don't always follow the rules, nor cross in designated locations. In rain or darkness, it is difficult to see the pavement markings. In-laid thermoplastic may be a viable solution.
24. The four lanes on Lakelse Avenue are narrow, especially at Sparks Street. A lane diet may be viable, but must consider bus movements, and queuing at Tim Hortons.
25. Pedestrian crossings on Lakelse Avenue at the Skeena Mall could be improved with sidewalk extensions and pedestrian-activated flashers. The existing flashers are continuous, and are more likely to be ignored by drivers.
26. More way-finding signage for Downtown would be appreciated.
27. Lazelle Avenue and Lakelse Avenue could be developed as a one-way couplet, which would improve traffic flow and safety. However, traffic circulation and wayfinding downtown would be a little more challenging. Also, this would invite more incidences of short-cutting through private parking lots as drivers attempt to circulate between the blocks.

Subsequent User Group Comments:

Submitted by: Yvonne Nielsen, Accessibility Advocate

1. A second Handydart bus is needed.
2. Accessible parking spaces in Terrace should have signage and painted wheelchair logos on the pavement for identification.
3. To make it easier for people with mobility issues, sidewalks must be flat, not slanted.
4. Planters, trees, shrubs, and other obstacles on the sidewalk should be placed to ensure safe and convenient passage of those with mobility challenges.
5. Better bus connections are needed.
6. Bus shelters should have anti-smoking regulations enforced. Also, litter should be picked up more frequently at the shelters and the sidewalks in general.
7. No Parking regulations should be enforced at yellow curbs, bus stops, and on sidewalks. Also, vehicles should not be allowed to park in bike lanes. Additional signage may be necessary.
8. If possible, bike lanes should be further offset from the traffic lanes.
9. In locations where the pavement edge is higher than the gutter pan, there is a hazard for cyclists.
10. The stairs on the Howe Creek trail are an issue for the mobility-challenged users.



Committee of the Whole

Time: 12:00 to 1:00 pm

Date: Wednesday, February 10th, 2016

Location: Council Chambers, Terrace City Hall

Attendees:

- Terrace City Council
- Rob Schibli, Director of Public Works, City of Terrace
- Chris Cordts, Engineering Supervisor, City of Terrace
- Meghan Dusdal, Design Technologist, City of Terrace
- Bernard Abelson, PEng, MEng, TOPS, Transportation Planning Lead, MCSL
- Glenn Stanker, PEng, PTOE, Senior Transportation Engineer, MCSL
- Chris Houston, PEng, Civil Engineering Manager, MCSL

Discussion Notes:

McElhanney presented the project scope and objectives to Council. The following feedback from Council was noted:

1. Positive engagement of the public is required especially for the pedestrian overpass. The affected demographic should be targeted. Also, the existing crossings of the CN rail yard should be counted.
2. The Terrace 2050 Vision should be incorporated into the plan.
3. The eastbound left turn at the Keith Avenue / Sande Street (Highway 16) intersection is a concern, and has had multiple collisions recently.
4. Tim Hortons traffic queuing has been improved on Highway 16.
5. Speeding issues are a concern on Pheasant Street, at the bottom of Lanfear Drive.
6. A new crosswalk should be considered at Walsh Avenue and Eby Street.
7. A pedestrian crossing should be reviewed on Kenney Street for school children.

Public Open House

Time: 6:00 to 9:00 pm

Date: Wednesday, February 10th, 2016

Location: Terrace City Hall

Attendees: approximately 12

Discussion Notes:

1. A new truck layover would be beneficial on the highway.
2. Land should be protected for a future overpass at Braun Street.
3. Ambulance drivers often do not know where dead-ends are until they arrive at them.
4. Car navigation systems direct drivers wanting to access the top of the Horseshoe to Eby Street, which does not connect up the hill.
5. McElhanney will contribute the designs for two staircases at Lanfear Drive and Eby Street.
6. If a pedestrian bridge is built at Kalum Street in favour of any other vehicle crossing, then it should also accommodate ambulances.
7. The steep gradient on the westbound approach of Park Avenue to Kalum Street is problematic in icy conditions.
8. The Lanfear/Pheasant intersection is a concern, and requires redesign to reduce traffic speeds entering Pheasant.
9. The trail along the railway corridor has safety concerns, especially when compared to Grand Trunk Pathway.
10. Barrier curb is preferred to roll-over curbs as it makes pedestrians feel safer. Boulevard separation would be ideal.
11. The study will define preferred typical cross sections for the different road classes.

Identified Locations for Consideration:

Using red dots on a map, attendees identified the following areas of concern:

- Keith Avenue at Kenney Street
- Lanfear Hill, top, middle, and bottom
- Sande Street (Highway 16) Overpass
- Lakelse Avenue at Eby Street
- Eby Street at Hamer Avenue
- Lakesle Avenue at Sparks Street
- Sparks Street at Straume, Tuck and McConnell Avenues
- Park Avenue at Emerson Street
- Kalum Street at Park Avenue
- Kalum Street at CN rail yard (pedestrian crossings)

Using green dots, attendees also identified positive issues in the Terrace transportation network, including: the streetscaped block of Lakelse Avenue (Emerson to Kalum Street); the new lane diet on Kalum Street; the Grand Trunk Pathway; the trail network around Skeenaview; and the opportunity for a new rail overpass at Braun Street/ Kalum Lake Road.

Terrace Standard Newspaper Article

Wednesday, February 17, 2016

Terrace, B.C. hosts open house on transportation plan



Residents had the chance to post red and green stickers on a map of the city last night at the Transportation Master Plan open house, to indicate good and bad spots. This feedback will be used by consultants on the project.

— *image credit: Josh Massey*

posted Feb 11, 2016 at 11:00 AM— updated Feb 11, 2016 at 12:24 PM

Residents, city staff and planning consultants mingled last night at an open house, part of the \$75,000 Transportation Master Plan commission by the city.

Those visiting the city hall event were given red and green stamps and asked to place them on a large map laid on the table. Green stamps could be placed on positive features of Terrace, while the red stamps were stuck to problem spots.

These suggestions from the public are being used to guide the plan being put together by McElhenney Consulting over the next four months.

The company's spokesperson for the project, Prince George-based senior transportation engineer Glenn Stanker, said that the secret to the success of thriving cities is having a vision and plan.



“Vision is important, and the number one thing is having a plan. When you apply for a grant, they will ask to see a plan that supports the project,” he said.

So what will Terrace's transportation priorities be? This is what Stanker and his team, along with the city, are working on.

Aside from the public consultation, there is also an online survey to gather what residents want in terms of improving transportation for vehicles, cyclists, and pedestrians.

There are many categories of city project being looked at, and prioritized. These include the tops and bottoms, as well as the widths and safety features, of Lanfear and Skeenaview hills.

Options discussed at a committee of the whole meeting also held yesterday included widening the street and/or sidewalks on these hills, and possibly closing Pheasant St. to thru-traffic at the bottom of Kalum in order to improve pedestrian flow.

Stanker said his team will look at options to making the hills safer in the short term, as they are steep, narrow, windy and much used by all sorts of commuters who tend to “compete” for room.

Intersections are also being studied.

Stanker said that Lakelse and Sparks is an example of a challenging intersection. So is Eby and Lakelse which he said “may not be intuitive to drivers”. Also, the intersection of Thomas, McConnell, Cooper around school hours. He said there could be ways to improve these and other intersections.

Rail crossings are another item included in the planning, with the “non-conventional” crossing of the tracks by pedestrians and the need for some sort of pedestrian overpass. A location for this could be part of the plan as well.

After stakeholder consultation, the next phase is data collection followed by detailed analysis in April, then May will see improvement options conceived, then in June the review will be ready, followed by a final report.



APPENDIX C

PUBLIC SURVEY



Terrace Transportation Master Plan: Public Survey

The City of Terrace and McElhanney Consulting Services Ltd. are completing a Transportation Master Plan that will address the following:

- *An expected increase of up to 30% in the city population over the next 10 years;*
- *Current and future transportation demands on the road, cycle, and pedestrian networks; and*
- *Effective local initiatives to promote the use of sustainable transportation modes.*

The outcome of the project will be a strategic planning document to guide future City investments in the transportation system.

To help us understand your priorities and concerns, we invite you to answer the following questions.

1. What is your overall impression of the existing transportation system in Terrace, in terms of:
 - a. Safety: (Very Poor) 1---2---3---4---5 (Excellent)
 - b. Reliability: (Very Poor) 1---2---3---4---5 (Excellent)
 - c. Convenience: (Very Poor) 1---2---3---4---5 (Excellent)
 - d. Guidance/Wayfinding: (Very Poor) 1---2---3---4---5 (Excellent)

2. What do you like best about the local transportation system?

3. Where do you have concerns with the local transportation system, and why?

4. What aspects of the transportation system would you like to see improved in Terrace?
(please rank the following according to your priorities, 1 being the most important)

- Road network (for traffic)
- Pedestrian network (sidewalks, crosswalks, etc)
- Cycle network (trails, bike lanes, etc)
- Heavy Truck routes (industrial and commercial)
- Dangerous Goods transportation
- Transit (bus) system
- Accessibility (for those with mobility challenges)
- Other _____



5. The likely location of a new vehicle overpass over the railway would be at Braun Street/Nisga'a Highway (Kalum Lk Rd). What are your thoughts on the priority of this project?
(Low Priority) 1---2---3---4---5 (High Priority)

6. How would you prioritize a new overpass across the railway that was dedicated to pedestrians and cyclists only?
(Low Priority) 1---2---3---4---5 (High Priority)

7. Kalum Hill (Skeenaview Drive) and Lanfear Drive currently have narrow road widths, which have contributed to safety concerns. How would you prioritize improvements to these roads?
 - a. Kalum Hill Drive: (Low Priority) 1---2---3---4---5 (High Priority)
 - b. Lanfear Drive: (Low Priority) 1---2---3---4---5 (High Priority)

8. On Lakelse Avenue in Downtown Terrace, the four lanes of traffic provide more capacity than is necessary for the existing volumes. How would you prioritize the importance of reconfiguring the existing lanes to create a safer environment for pedestrians, cyclists and vehicles?
(Low Priority) 1---2---3---4---5 (High Priority)

9. At three intersections in Terrace, there are existing concerns with geometry, traffic control, and traffic flow. How would you prioritize efforts to upgrade these intersections to improve safety and traffic flow?
 - a. Eby Street at Lakelse Avenue (in front of City Hall):
(Low Priority) 1---2---3---4---5 (High Priority)
 - b. Lakelse Avenue at Sparks Street (at Safeway/Bank of Montreal):
(Low Priority) 1---2---3---4---5 (High Priority)
 - c. Thomas at McConnell/Cooper (top of Lanfear Hill):
(Low Priority) 1---2---3---4---5 (High Priority)

10. What other issues do you feel should be considered in the Transportation Master Plan?

11. Other comments:

12. What is your:

- a. Postal Code: _____
- b. Age group: 5 – 15, 15-25, 25-45, 45-65, 65+

Thank you! Please return your completed survey to an attendant.

Question 2: What do you like best about the local transportation system?

- 2 bridges over Skeena. - not a lot of lights and short durations
- cheap way of transportation. - covers all the areas around Terrace
- the sidewalks we have are generally maintained in winter - getting cleared quickly following snow fall. - lights are quick @ intersections - parking is pretty good
- "We have one". We are re-evaluating at present, important as population increases.
- Handi-dart. 2. Sandi-overpass greatly improved. 3. Roads getting fixed.
- With just a few changes, significant improvements can be made id. 4 way stops, stop signs. 2. Overpass improvements (if drivers could figure it out). 3.Improvements to Kalum St
- 2 lane
- Actually do not use it yet
- Addition of bike lanes and sidewalks during road improvement projects
- adequate amount of seating
- affordable busses and being able to travel to Kitimat and back in one day
- Almost everything is in walking distance in this town.
- Appears to be a willingness to make some of the busy intersections safer, e.g. the Overpass! That was a scary one for drivers and pedestrians.
- As a pedestrian many of the sidewalks are wide enough to accommodate users of all types ie.strollers, scooters, bikes.
- As a senior, I drive my own car, so have not used the transportation system.
- at least it goes to the college
- At least there are SOME bike routes, well-used sidewalks and a transit option
- at least we have some.
- at this point absolutely nothing!
- Available access to Kitsumkalum
- available parking along Lakelse Ave
- big bus for small community
- bike lanes
- Bike Lanes but more are needed
- Biking in Terrace is easy and fast.
- Bus system and millennium path
- Cabs are horrible. Poor service all around. Busses can run more frequent
- Cheap, quick and easy access
- City requirements for sidewalks. Revision of traffic pattern on Kalum was good.
- Community Walk-ability
- Convenience
- Covers a wide area
- Crosswalks for pedestrians, traffic lights at most major downtown intersections, light at South side of Sande overpass - a big improvement
- Cyclable
- Do not use it
- Doesn't look like much thought has been put into it in the past!
- Don't use
- Downtown
- Downtown Terrace amenities are compact, accessible by foot from horseshoe.
- easy access throughout town
- Easy grid system, adequate winter clearing
- Easy to find way around
- easy to navigate around town
- easy, point A to point B
- Everything is relatively close and quick to get to.
- exit to Tetrault from overpass (finally able to make turn without worrying about hit from rear
- fairly convenient and easy to get to
- Fairly good traffic flow,
- fast transportation , ease of access
- Few traffic lights
- Fewer loose surface roads in town every year.
- For the most part it's pretty easy to navigate if you know the roads and where the lines should be for lanes.

- Frequent trips in town routes
- good infrastructure
- Good snow removal
- Good street signs
- Grand Trunk Pathway and Howe Creek trail
- Great for cyclists
- Grid pattern is convenient
- Hard to say....its what i am used to
- Having Highway 16, extending easterly along Greig and westerly to Kalum Lake Road as a linear access along the southerly face of the City north of the CNR and Keith Avenue, being a similar linear access along the northerly face of the City lying south of the CNR. The multiuse pathway added to the south of Highway 16 is a tremendous asset.
- I actually do not use the local transportation system
- I am happy to see the annual improvements to the roads, sidewalks and cycling routes - it's nice to see that improving the roads is a priority of the City.
- I am opposed to hwy 16 having right of way through town..out of town people don't understand
- I believe this to be true but don't use buses, it, my students do, but they mostly take cabs
- I don't like anything..
- I don't use it
- i dont use it.
- I don't use the transportation so this is why I'm putting average. Not good but not bad.
- I don't utilize local transportation in Terrace.
- I know how to get where I'm going in a motor vehicle
- I like that everything is close. There is no more than 4km from my house to anything I need
- I like that it doesn't take too long to get anywhere in town
- I like the ability to go from one end of town to the other using one street; although certain parts of the dual lanes are very unsafe.
- I like the new bike lane on Kalum
- I live east of town and appreciate the two routes into Terrace
- Improved safety at crosswalks over the past 5 years
- improvements to cycling infrastructure
- Improvements to overpass
- Improvements to the south end of Sande Overpass
- In general there is no traffic congestion
- It has improved. the lights on railway overpass by Skeena mall is great.
- It is evolving the town's "city status" while still having the convenience and reliability of a town.
- it is simple
- It is very simple to navigate.
- It moves.....
- It's available at most rural areas
- Its small transportation system with low population. Roads allow traffic to flow freely without many interruptions.
- Kalum St road diet, Grand Trunk Path, Sande-Keith signal
- Lack of traffic
- Light for pedestrian on Lazelle & Kalum should have left hand sign at McDonalds
- Light Traffic
- Light traffic, easy parking
- Like that I can bike and walk places.
- Like the new lights on sande overpass
- Local Trail system
- Lots of walking areas for everyone
- low cost
- Low traffic
- Low traffic volume
- low traffic volumes
- Main Highway is straight through the town.
- Millenium Trail and network in the Horseshoe
- Millennium trail
- Millenuim Trail

- More routes and better access for people with disabilities.
- Most areas are working good. A flashing light and crosswalk must be installed at the bottom of the Lanfeear hill.
- Multiple lanes of travel
- N/a
- Never used it; cannot comment.
- New intersection on overpass
- New light at overpass
- New light at Sande overpass
- New light at the overpass.
- new lights at overpass
- new lights on overpass
- New over pass.
- New overpass
- New overpass. Much less congested!
- New sidewalks put on McConnell.
- newly paved streets
- No real "rush hour" traffic.
- No rush hour
- Not confusing or hard to navigate - no one way streets
- Not much especially in the winter.
- not much to be honest, poor planning is evident everywhere
- not much traffic
- Not much traffic
- Not overly crowded with cars, not too much speeding
- not too busy
- not too much traffic
- not too much traffic
- nothing
- Nothing
- Nothing stands out
- nothing stands out
- Nothing. Well maybe the Millenium Trail.
- now adding in sidewalks on all newly paved streets.
- Number of traffic lights is good
- On time
- once we get used to the new traffic flow at the south end of the overpass. The designated bike lanes.
- Other than Lanfeear Hill needs a right hand turn lane. And lunch & 3pm traffic is a nightmare.
- Overpass is improved.
- PLOWed regularly in the winter
- Plowed regularly in the winter
- Reasonably good streets
- recent consideration for bike lanes
- Recent improvements made on the overpass
- reliable
- Safety with exceptions.
- Sande overpass intersection improvements and 4-way stops
- Signs in some are clear, when put up properly.
- simple
- Simplicity now, however this may not function well in future
- Small town, if a person wants to walk everywhere it's not that tough.
- Small town, no need for a lot of traffic lights
- Terrace has some bike lanes.
- Terrace is relatively small and navigating the streets is easy.
- That it is improving with time. I define walking as part of the system. This aspect is slowly improving. The rest of the system is really basic grid.
- that it runs efficiently and timely
- That there is a bus system we have one even though it's unreliable.
- That there is something available

- The bus system has all newish buses, most of the taxis are updated
- the changes to the sande overpass have helped
- The consistency of bad intersections
- The double turning lanes on over pass turning onto Keith
- the easy walking distances
- The extension of the millenium trail. The 3 way lights at the overpass (new)
- The fact that there is a lot of improvement to promote Bicycle use.
- the flow of traffic seems to be well thought out
- The flow.
- The grid layout makes it easy to navigate the downtown core.
- The Howe Creek Trail, the condensed nature of downtown making it walkable
- The lights at the overpass are a step in the right direction
- The limited use of traffic lights, meaning the beter use of signed traffic.
- The millenium trail/grand trunk pathway
- The millennium trail
- The most efficient transportation segment is for thru traffic on Highway 16 but a second crossing must be planned for. The "best" about the local system is that it tries to mitigate the town being divided in two by the highway.
- The new light on the overpass is a great addition. The intersection is much safer now.
- THE NEW LIGHTS ON SANDE
- The new overpass
- The new overpass work makes sense
- The new set of light on the end of the overpass
- the new traffic lights at the Sande overpass
- The price for bus fare.
- the price is fair for public transit. the highway system is easy to navigate for visitors.
- The recent improvements around Terrace.
- The size of some downtown sidewalks
- The the main roads were recently re-paved.
- The upgrades to the sande overpass
- There are usually several ways to get to one place
- There is a fairly dense city centre so everything is close.
- They are well known since there are few options for transportation so everyone knows the numbers etc.
- They hit all main actives
- They should have the transport go some where else it makes the over pass too much traffic
- to few passengers for a big bus
- Traffic generally flows fairly well now, but as traffic volume increases, there maybe increasing pressure on the current infrastructure.
- traffic in downtown has many alternatives , so drivers can choose a safe less busy route if immeadiate conditions suggest to do so.
- Traffic seems to flow quickly
- trails
- two bridges over skeena, improvements to intersection S of overpass, trails
- Up grade on overpass
- Upgrade to Sande Overpass
- Variety of transportation options that will meet my needs - walking, cycling, driving, public transit
- Very little traffic.
- Very minimal traffic/delay issues
- Wayfinding is fairly straight forward.
- We have busses that go to more areas.
- We have one .
- we have one! i've never used the bus system.
- We need to get the transport and long haul trucks through Terrace as easy as possible.
- Where it's done well, it's really well with bike lanes, sidewalks and nicely paved roads
- width of streets

Question 3: Where do you have concerns with the local transportation system, and why?

- goes to Gitau, no one ever on that bus maybe use small bus.
- like to see roundabouts, more network paths between streets & subdivisions, more cycling lanes. - biggest concern = the city is set up to be a driving city, not a walking or cycling city - our main focus should be on pedestrians in downtown not vehicles.
- *Calcium should be free to residents living on a dirt road!
- 1 - Too many drivers don't understand how to use four-way stops. 2 - A new overpass at Hwy 16/Kalum Lake Rd jct should have taken priority over the elimination of the railway grade crossing west of the City. Poor planning on MoT and fed govt.
- corner of Keith & Kenny - need a light here - is a busy intersection, 2) need a second overpass over CN tracks - many delays in trying to travel north/south along Kenny St at Hwy 16.
- Downtown is geared towards drivers - not cyclists or pedestrians. 2. Access to GrandTrunk Pathway is poor-large span of highway before you can access the trail network. 3. Downtown speed limit should be reduced to 30 or 35km /hr.
- Very bad lighting at all crosswalks and the crosswalk in the centre of Lakelse Ave, very poor visibility because of cars parked on road on both sides.
- 4 way stop - ineffective for amount of traffic utilizing this. Too many accidents! Ineffective.
- 4 way stop on highway. Most people don't know the rules.
- 4600 and 4700 haugland. Mills memorial hospital have verflow parking on the street, northern health bus and neighbouring village buses offload and pick-up there, kids from Cassie Hall school wander from the school field and need to get to sidewalk. no school monitors to keep them safe, and the road surfae is full of porholes. and homeless people are pushing buggies, and seven sisters residents are seen looking lost or confused.
- active transportation needs to have more support
- Availability and access.
- Bad roads
- Bike and sidewalks by road that Polly's Cafe is on. Not safe enough.
- bike lanes / access on Lanfear & Skeenaview Drive
- Bike lanes in a town that had rain or snow 80% of the time is a waste
- Biking is dangerous. Many people get hit on the road becuase driver's often aren't aware of bikes or pedestrians.
- Bothers me to see near empty buses running
- Bottom of Lanfear hill. Lack of pedestrian crossing and speeding traffic (2 issues). Also, degrading Howe Creek Trail as it comes down the hill into the tree park. The hillside is eroding and presenting cobble rocks onto the path which is a biking and tripping hazard. This corner (behind the berm at the base of Lanfear) should be redone.
- Bus needs more frequency, more stops
- Bus routing can be confusing, a better time guide would be nice, and also actually telling people where stops are
- bus stops not well distributed
- Buses should run on sunday! run a bit later - offer courtesy rides on certain events. We need a second taxi company. We need another overpass prefferably by the liquor store on Kalum St on the southside.
- Cab company is horrible because they have the monopoly on the taxi permit
- Commercial vehicles within city limits - the trucks are too large to safely manipulate corners, narrow streets etc.
- Commuting on bicycle around town is sketchy, especially downtown with the weirdly aligned intersections and no bike lanes.
- concerns re; safety for walkers/cyclists particularly in adverse weather conditions **also, not being able to ride a bike on the road up Skeenaview Drive is very difficult
- Condition of most roads is poor. New bike lanes are seldom accessible, as people are constantly parked in them.
- confusing intersections. Need sidewalk on Park east of Eby.
- Confusing traffic signals
- congestion in the center of city.
- Constricted and unsafe access via road to bench
- Crossing to the southside and getting up to the bench...
- Crosswalks, no lighting above to illuminate crosswalks, especially if they are new to the system
- Cycling is a challenge - it is especially hard to get to the "benches" - the narrowness of the roads are a safety concern. A stairway to the benches may be a good idea however those with mobility issues or

- strollers will most likely not be able to use a stairway. More bike racks please. Visibility (especially during the dark winter months) - it is challenging to see pedestrians and cyclists on the the road - we need better lighting especially near crosswalks at schools. Improving the connectivity between the north and south would be beneficial and encourage greater connection regarding transportation as well as the community in general (reduce "north vs south" mentality). The recent road diet on Kalum St worked great - traffic calming measures for Lakelse Ave would be a great idea. Reduce "confusing" intersections by adding roundabouts to keep traffic flowing. Lessons/open houses to discuss how one drives through a roundabout or 2-way left-turn lane should be high priority. I am not too concerned about the "truck route" as this will most likely be the only plausible route for them to use - however, making this route safer for all road users should be high priority - the changes made to the Sande overpass is such an improvement but I find that the truck drivers at the Keith Ave and Kenney St intersection are very aggressive and dangerous.
- cycling space issues in some areas
 - Dangerous (4- way stop @ old bridge) and too busy for the current infrastructure (need another overpass)
 - dangerous intersections like keith and kenny
 - Difficult to travel by bicycle. I carry my children in a bicycle trailer and it is impossible to get from Terrace downtown to the bench safely. Sidewalks are not cleared promptly after snow (ie. sparks street), so it is very difficult to push a stroller or use a wheelchair in the winter. Eby street intersections are not intuitive. It is unsafe to cycle across the overpass, but few alternatives exist.
 - Difficulty getting across the tracks with only one actual overpass
 - Downtown core - bike safety
 - downtown on Lakelse where there is street parking + two lanes. I have had several near misses there - it is too tight for parking and 2 lanes of traffic. Lanfear hill is also frighteningly narrow and the intersection of McConnell and Thomas is a Zoo! It has often been backed up McConnell almost to the 3-way stop!
 - drivers go too fast. school buses need seat belts.
 - empty buses perhaps one passenger need to use small bus in non peak times. Dust maker! Waster of tax payer money. pollution etc.
 - everything! roads are too narrow, parking on streets makes it hard to drive safely and to see people walking
 - Extension of Thomas St to connect with Johnson Rd would balance traffic loads from the northern areas onto Kalam and Thomas.
 - Few pedestrian sidewalks and too-narrow sidewalks (eg. Lancer and Kalum... and I wrote that before looking at Q8!). Poor connection between Southside and town. Confusion at main 4-way stop (round-about would be better).
 - Flooding on Keith when it rains, lack of access when train goes through, roads not directly connected ie: Kalum
 - Generally-more sidewalks on the South side for safer pedestrian access. Specifically pedestrian x-ing of Keith at Kenny: long x-ing in industrial traffic/two way stop where Keith traffic sometimes makes risky crossing to avoid long wait.
 - getting killed on my bike (pedal)
 - Getting to South side by Bike, walk means only two choices. Overpass is awkward. On a Bike it is not safe. Driving through city centre is full of parking lots with people pulling out (especially at busy time), Mcdonald's Xwalk is often obscured by left turn drivers, straight thru driver go by and sometimes pedestrians are in the crosswalk.
 - Greig St could be re-paved. Notifcation lights at 3 way stop.
 - Greig St needs paving.
 - Halliwell Avenue and North Eby Street- extremely heavy traffic and everyone including city graders speed
 - Hate the Kenney-Keith intersection. Feels very unsafe
 - Heavy transport vehicles are still a concern on some routes
 - I cycle. Bike lanes are too narrow or non-existent. I ride the sidewalks where possible. There are a couple of crossings with serious traffic flow or safety issues. Frequently I observe drivers running the red light at Park and Kalum when Park drivers or riders have the green. It is also a hassle to get accross Kenny on Kieth at certain times of the day.
 - I feel that there needs to be more speed signs along with sidewalks
 - I have concerns with vehicle traffic at the Kenney/Keith intersection. In busy times, you can wait quite a while to proceed east/west along that route. Often it causes impatience with drivers and close calls with both pedestrians and other N/S traffic. A 4 way stop or, better yet, lights would be very well received there. Sidewalks are also terrible (in front of the hospital) where they were just done with quick paving and not proper concrete. I would prefer to see sidewalks not so close to the road with a strip of greenspace between traffic and sidewalks.
 - I have no concerns but i would be an advocate for a bus system that ensures transportation for seniors, students and those with mobility issues.

- I live on corner sparks/halliwell and traffic is always flying past my house with no regards for using blinker and often scary to cross as a pedestrian. A 4 way stop would slow traffic down and increase safety for pedestrians.
- I think that there is a lack of bike lanes and that they are not kept clear or maintained well. There is also a lack of bike racks in Terrace. Also, people need to start being ticketed for not use signalling to indicate that they are switching lanes. We would not have the problem intersections if people would learn to take thier lane and let others know if they are going to switch lanes.. Also more traffic control around the schools and REM Lee.
- If increase population maybe get bus to lake or other tourist things on weekend? Terrible customer service and reliability of taxis.
- Infrequency of trips in rural areas and the fact that the bus doesn't run in these rural areas on the weekend when most lower income and students have days off and need transport to and from town.
- intersection (Eby/Lakelse by city hall)
- Intersection into to town. Should have lights there not towards Prince Rupert.
- Intersection Kenney and Keith Ave
- Intersections with poor sight lines, mostly because locals are used to it being less busy, and sometimes aren't very careful
- It is difficult to get certain places safely and conveniently on a bicycle
- It is difficult to quickly get around town by bus. And there are is only 1 option in/out of Thornhill after dinner time.
- It is not easily accessible or frequent enough.
- It would be great if the lower traffic areas would be re-paved soon (i.e. area near Best Western Inn/Shan Yan resturant and Curling rink area would be a good start).
- Kalum (2 lane, with center turn section) poor transition north from double lane to one lane. Also hazardous pedestrian crossing with center turning traffic and through traffic. Keith avenue from new bridge to overpass - likely issue for future congestion.
- Kalum and Lazelle. The crosswalks are unsafe.
- Kalum St between Park and Walsh - confusing hazardous lane change markings. Much confusion downtown - the intersections at Emerson/Lakelse and in front of City Hall. The lack of an overpass between south Terrace and the Horseshoe at Kalum St. Pedestrian challenges in general. etc etc
- Keith & Kenney intersection
- Keith / Kenney Intersection
- keith and kenney intersection - it needs traffic lights installed
- Keith and Kenney, needs full light controlled instersection, too many accidents and deaths at this location
- Keith Ave & Kenney St intersection is a horrendous, because it needs a 4-way stop
- Keith Avenue - too many business that require left hand turns. Snow clearing in town that blocks the sidewalk access.
- Keith Avenue and Kenney Street is very dangerous for pedestrians as no crosswalk(s) to cross Kenney Street.
- -kenney and hwy 16. Keith and kenney
- kenney and keith (accident waiting to happen, and it does) Need drivers on Kenney to slow down and keep to the speed limit, drivers don't always follow rules for giving left turning vehicles their right tio turn onto Kenney. Otehr areas of concern are where trees, and bushes block line of sight (e.g. planter by Creative Zone)
- Kenney and Keith intersection - frequent accidents
- Kenney Street and Highway 16 ... conflict with train traffic
- Lack of bike lanes, people parking in bike lanes, better downtown parking.
- lack of convenient schedule, after 6 pm seems difficult to find a bus
- Lack of parking downtown. More cyclist lanes and places to lock bikes to promote cycling. Intersection in front of city hall - needs to be a 3-way stop!
- Lack of public transit to outlying areas
- lack of rail crossings and streets not lighting up
- Lack of rural bus routes
- lack of safe cycling lanes from Thornhill to Terrace, and from the Terrace Benches (lanfeair, kalum, above arena) into town
- Lack of services (buses especially). More sidewalks would also be great!
- Lack of side walks on many "streets" for example, Tuck, Olson etc. Seems to be more sidewalks on avenues. Would be nice to have more sidewalks on streets in the horseshoe area. Better lighting at night & early morning. Very dark and feeling unsafe when going for runs in early am.
- Lack of sidewalks

- Lack of sidewalks for walking in residential neighborhoods, lack of bike routes
- Lack of sidewalks, esp south side.
- Lack of sidewalks, lack of bike safety in part due to driver attitude, poor snow clearing of sidewalks, confusing intersections with no advance signage such as Kenney and Keith indicating it is only a 2-way stop, poorly placed stop signs, hydro poles obstructing driver views along Hwy 16 stretch Tim Hortons, all west glass area, heavy traffic not coming to a complete stop at Keith and Kenney
- Lack of traffic lights in key areas
- lack of upgrading
- Lake Else - 3 way, top of Kalum St and Munthe Ave. - close it
- Lakelse & Sparks - This intersection should be squared up by sweeping the segment of Sparks St south of Lakelse west to align at right angles so the traffic signals can be normalized. Now is a great time as there is no development at 4711 Lakelse. Secondly, traffic signals should be installed at Kenney and Keith. Traffic backs up on Keith back to Kal-tire early morning, lunch and late afternoon. As this is the truck route as well, tractor trailers have a hard time crossing during these periods, and this intersection is prone to accidents.
- Lakelse Ave. between Apsley and Emerson Streets feels narrow. There is always the potential of getting too close to parallel parked vehicles.
- Lanes too narrow on Lakelse for 2 lanes + parking. There should be many, frequent buses that are smaller
- Lanfeer and Skeenaview Drive. Lanfeer sidewalks are narrow and appear to be falling apart. Narrow for traffic and pedestrians.
- Lanfeer Hill is too narrow, top of Lanfeer Hill is congested and has lots of kids going to school, Kenney and Keith intersection is very busy and chaotic, left hand lane travelling east on Keith and Sande overpass is confusing if there is oncoming traffic...old habits perhaps.
- Lanfeer Hill, Skeenaview Drive: too steep, too narrow, too unreliable with soil stability for future bike travel, safe motoring, people walking, wide vehicles negotiating the hills
- Lanfeer Hill - because it is scary trying to walk/run along there, and would be great to see another overpass across the train tracks.
- Lazelle/Kalum intersection is near impossible to enter. Almost worth just shutting that intersection down all together. Munroe/Hwy 16 and Thomas/Lanfeer with those telephone poles right on the corner dangerously impeding vision while attempting to enter traffic.
- Limited pedestrian and cycle access to bench
- line visibility, road width
- Little inclusion of cycling lanes. Cycling is unsafe, especially to/from the bench and on the overpass.
- Living on the southside, I find Keith Ave very busy. There is a need for another overpass, leading to downtown and Hwy 16. West and East.
- Main St is too narrow for parking in both sides.
- Main street. The fact that when you are parked, there really is not enough room for four lanes of traffic.
- Many unsafe/confusing intersections and poor conditions for cyclists to access the bench area.
- Maybe some runs on Sunday, 11 - 4
- Minimal availability to NWCC & Kitsumkalum
- More information needs to be posted regularly, i.e.: scheduling, route changes
- More names of streets on 4 way.
- More room for bikes & pedestrians
- More sidewalks please - on all routes within the city. More signage - Crescent street in Thornhill is missing its sign. Walking path that includes sidewalks around the bridges and continues to Ferry Island then down past Walmart.
- More than one overpass to get over CN tracks off Keith to Hwy 16. Lanfeer will provide proper road room & walking path - safety. Lakelse & Eby intersection change - flashing lights - yellow for caution. Lakelse & Red Eby plus stop sign
- Most of my concerns are with people who have poor driving skills.
- My main concern would be biking east across the double bridges. Second would be routing heavy traffic west along Keith.
- N/A
- n/a
- near city hall (awkward for all), on hills to the bench (Kalum + Lanfeer too narrow), 4way at jct to Kitimat (need lights)
- Need a better system at the intersection at city hall; paving of all roads in the city limits should be the responsibility and priority of the city; intersection of Eby and Lazelle very dangerous for pedestrians; need more speed bumps to slow people down; railway crossing holding up traffic and/or promoting unsafe behaviours in pedestrians and drivers

- need LIGHTED crosswalks / sidewalks (more reflective markers). Need an overpass over KALUM st southside-northside.
- need to expand routes up to Dover Road, population in this area is growing
- Neighbourhood streets have no sidewalks. No walking connection from ends of culdesacs to other streets or trails. Poorly maintained trail system. Terrace is focussed on drivers, not walkers - but walking is critical to health and retaining long term residents/ retirees.
- Never used it; cannot comment.
- no
- No buses on Sundays, infrequent times. Also streets don't line up in front of BMO/Bear Country?! Worst traffic light in history!
- No busses on sundays may lead to drinking and driving
- no concerns
- No enough cycle safe network
- No left turn on Keith Avenue / Train rail crossing on Kenney / No green flashing light to turn left on traffic signals
- No opinion
- No or limited buses on weekends. Could use some creative thinking on that. Poor lighting of streets, especially from bottom of Kalum Lake Rd to the NWCCollege. No sidewalks to shelter pedestrians. Lines are faded out. Train movements and holdups are poorly scheduled. No adequate drainage of areas, i.e. South-side. We need a better way to leave the hospital to the overpass. Safer walks over the bridges. Pedestrians are comatose and often oblivious to traffic. Those driving trucks are aggressive and make risky moves, right in town. Traffic is increasing and people are not coping with the increase, especially with heavy equipment movement. We need to open a road over the tracks at the intersection of the Kalum Lake Rd and Hwy 16 to syphon off the risk. We need a light system at the 4-way stop on Hwy 16 and Kitimat Hwy. Why? To save lives and adjust to the changes. We need more bus/people shelters in windy areas, i.e. overpass, Walmart area, etc. We need bus markers and timetables included.
- No posted speed limits, Drives are going way to fast. At least 10km over the speed limit. Kalum st.
- no, just the drivers and pedestrians
- none
- Non-vehicle connection of the Southside to the horseshoe is poor
- North Eby; it is a main roadway and there is no sidewalk (or even a gravel shoulder)
- not bike-friendly; poor maintenance of common roads in the horseshoe area
- not designed for heavy traffic, not enough ways to get across town with trains, not enough pedestrian overpasses for safety with trains
- not enough bus runs, though many run empty. smaller vans with more frequent and out to outlying communities would help a lot.
- Not enough handicap parking for senior centre
- not enough lights and crosswalks
- not enough safe pedestrian passage or clearly marked driving lanes.
- Not enough side walks
- Not enough sidewalks, access to sidewalks are not always wheelchair safe.
- not enough times
- Not frequent enough - especially weekends
- Offset T Intersection, cover Safeway/BMO sparks/Lakelse re-route Sparkes through ___ area on west side so it is a regular crossroad, allowing right turns on red lights.
- on time
- One overpass across the CN rail yard in close proximity to the hospital, the ambulance station and the fire hall. Should there be an incident on the track under the overpass the south side and north side of town could be isolated from the hospital or emergency response.
- Parking down town - flow thru traffic Hwy 16 commercial traffic
- Pedestrian safety - especially on left hand turning vehicles
- Pedestrian walkway/crosswalk and general lighting of all pedestrian areas I feel put pedestrians in unnecessary danger.
- Pedestrian walkways or bicycle passage on highway 16 over the Skeena River. The current sidewalk is only on one side which means bicyclist may face on-coming traffic and pedestrians have to cross the highway to get to ferry island. Would suggest building a second sidewalk on the south-side of the bridge or build a separate pedestrian bridge on the side or underneath the current bridge. Like stated this is a suggestion.
- Pedestrians and their safety mainly at crosswalks
- places like the overpass and the post office. the four way, the spot by safeway and bear country inn.
- poor condition of the majority of streets

- Poor lighting at pedestrian crossings and lack of bicycle routes. As a driver it can be extremely difficult to keep track of pedestrians especially during the fall and winter months when visibility is reduced.
- poor road condition, poor planning
- Poor road maintenance. Intersection designs by safeway and husky
- Pot holes for cyclists
- pot holes,
- public safety in terms of pedestrian traffic and poorly marked road ways
- railway crossings and poor secondary road surfaces
- Road condition is poor for cycling, efficient cycling and pedestrian connections between 'the bench' and 'the horseshoe' are lacking, cross walks are needed to connect the millenium trail to services across the road, pedestrian and bike access to natural areas could be enhanced.
- Road conditions, NOT only in the winter with clearing, but the amount of sink holes and gravel.
- Road lines are almost completely eroded in MOST areas. Bike lanes and pedestrian sidewalks are inadequate. Insufficient train track crossings.
- Road/Sidewalk repaving - have you walked the 4800 block of Loen lately? Bike infrastructure - safer access to Ferry Island for families and tourists? Beautification of Lakelse along entire length of roadway? Consistent sidewalk for those that want to "walk the bridges"?
- roads in bad shape. can't see lines. lines that don't make sense. lack of second way across tracks when trains are there.
- Roads too narrow. I drive a full size truck not a little car.
- Route information is not incredibly clear. For example; if a bus operates in a single direction loop, that should be indicated so I can plan my trip
- Rules of the road not enforced for cyclists, pedestrians, motorists
- running time and amount of locations hit makes less people want to take the bus
- Safety - odd intersections, Convenience - trains blocking Kalum, Highway 4 way stop
- safety at intersection of Keith and Kenney
- Safety concerns with certain intersections ie. park/Kalum overpass by postoffice four way
- Safety, especially for pedestrians and cyclists. There are not many cycle routes and especially on the 'major' roads cyclists need to share the road with (heavy) traffic. But the problem also exists for 'smaller' roads and e.g. the connection to the bench.
- Sande Overpass - safety issue turning left from west onto overpass - should have left turn sensed signal
- Second crossing - safety and convenience I
- seems as though smaller cuses would sufficient & more economical
- Semi truck, logging trucks, should go straight up Keith, not over the overpass. New overpass needed for this.
- Should have smaller buses & more frequent pick up.
- Sidewalks - not enough in horseshoe area
- sidewalks in the winter months. The sidewalks need to be plowed right away and kept on top of moreso that the streets. There are many people in our community that have to walk and are forced to walk on the roadway as the sidewalks are unsafe. #2 a pedestrian crossing over the tracks on Kalum Street.
- Sidewalks!
- Snow removal poor, dust control very poor.
- some areas are not serviced well for modes of transportation other than vehicle. For example walking from the college area to the swimming pool is not easy (no sidewalks, some traffic navigation)
- some confusing intersections, too many speeding trucks, insufficient sidewalks, bike routes and transit options
- Some intersections are congested and are a safety hazard
- Some intersections are dangerous and need traffic lights rather than stop signs (Lazelle & Kalum)
- Some local roads are very run down and needs resurfacing. Bus system is garbage. Avoid the bus. Either leaves late or early. The older bus driver lady kicked me off the bus once when i was 5 cents short (I was in college). Never again.
- some major roads such as Kalum Lake Road, Queensway, need a safer sidewalk (may not be city). Also the 4 way stop at the scales should be a round - about. Parking in town is lacking. all businesses should have to have a % of parking for staff and customers. Perhaps if this is brought in- a bunch of businesses can buy vacant lots to use for their staff parking (lot in Cormier of Lazelle/Kalum, lot between Park/Davis 4700). Not having enough parking especially in winter months when people should not have to walk long distances over ice is a huge safety concern and very much tied into transportation. Another huge problem is the constant pot holes in front of city hall - very damaging to small vehicles and people swerve around them- almost hitting others.
- Some roads should be opened up (Park) there are also others

- south side of overpass needs delay light for left hand turns going east
- Southside is more isolated with only one overpass although much better since the improvements, another would be good but probably better to spend less money on a pedestrian/cycle overpass.
- Southside, need to improve the safe flow of commercial traffic
- Sparks & lakelse (or lazelle) where there is an off set intersection, unsafe and inconvenient, need to create pedestrian friendly network.
- Speeding through school zones, using school zones for main routes. Need to route main traffic flow away from school zones - specifically Walsh Ave and Cassie Hall
- strange intersection (ex. Lakelse-Eby, Sparks-Lakelse, lack of east connection North-South of town)
- The 4 way intersection of highway 16&37 as a truck driver it is very difficult to safely exit from the scales and also I want to see a pedestrian controlled traffic light at Clark and highway 16
- The 4 way stop in Thornhill Is hazardous when traffic is heavy. Seems that people panic when arriving at the stop and don't know what to do.
- The areas that have been identified in this survey are in line with areas of concern that i have. Also, the new lights at the overpass could be improved. Drivers don't seem to be adapting to the new system resulting in accidents.
- The bus schedule isn't convenient for anyone especially for university students. The bus are not reliable because they are regularly late due to one bus running per route and too long of routes. The weekend and evening bus schedule is horrible last I checked. There are a few intersections that need to be fixed or have a proper light systems. There need to be more bike lanes and working sidewalks. The snow clearing in the winter on the sidewalks need to be maintained better. A huge problem is the no proper road drainage! This is terrace we get lots of rain and snow so all main roads should have drainage to protect pedestrians
- the buses are dirty and drivers have left this patrun at the bus stop just because i am brown.
- the CN crossing on Kenny Avenue
- The downtown traffic at Tim Horton's location is congested at times. The double lanes in the downtown core are not always usable or safe.
- The intersection of Kenny and Keith should be a 4-way stop and the timing of the train at the highway and Kenny
- The Keith Ave And Kenny St intersection need to have traffic lights installed
- The lack of buses going to and from Thornhill in the evening and no sunday buses.
- The lack of enforcement of the traffic regulations. (ie illegal turns, and pedestrian assults with water and snow by splashing
- The lights on the one-way bridge frequently malfunction
- the lights should be synchronized to maximize traffic flow for peak hours
- The new Kalum St traffic pattern. Who ever designed it was obviously tripping balls.
- The overpass and bridges are "pinch points" restricting the flow of traffic through the city. Highway 16 snakes all over the place and Keith Ave is too busy with commercial, residential and traffic corridor demands.
- The pedestrian traffic needs to be addressed.
- The potholes on city streets. And poor lighting on kalum by the courthouse and going up Skeenaview Drive
- the public transit is so little its pretty much not usable for a large majority of people
- The rail system dividing the town is annoying, but that will never change.
- The railway crossings
- The roads are getting full of ruts and potholes.
- the schedules and maps are very confusing for public transit. The road lines are impossible to see at night while driving. Cat eyes are a must!
- The side walks and crosswalks not always in useful places
- the size of lanes, people parking on the side of the road on Lakelse/Lazelle Ave, our streets are too small for this. We need a parkade to free up our roads and safety of the pedestrians. lots of times people dart out in traffic from behind a parked car and makes it terribly unsafe
- The Skeena bridge is a choke point, the 4 way stop at the scales is dangerous and should be made into a traffic light controlled.
- the speed of traffic has increased with less and less concern for people and the rules of the road. Speed through school zones has increased. Walsh near Skeena School, for example, averages 42 km/hr. I've witnessed several at 60 km/hr. The posted speed is 30. This applies along Haugland near the hospital as well. Landfear and Skeenaview Drive both have speed problems. Lanfear is particularly bad with an average speed above 50km/hr. Kenney, Sparks, Kalum on the south side have (generally) have increased. Lakelse east of Kalum is also a problem. I check speed by 'tailing' a sample of cars. also jay walking bike lanes and sidewalks (although all enforcement issues)
- The various potholes, especially near the city hall.

- there are no buses on the weekend for people travelling to Kitimat but only during the week which is an issue for many people
- there are several intersections which are inconvenient and potentially dangerous
- There is only one main bridge over the tracks
- There needs to be more cops out patrolling. People are less likely to speed in school zones and cut people off if there are cops out watching
- There needs to be more lights, in particular right in front of City Hall, or at least a new system of some sort.
- There should be a left turn signal at the new overpass light turning from Keith onto the overpass. Also, a 4 way stop or light system at the Kenny Keith section. Pave that mess that is at the Mainstreet corner which turns onto Eby, VERY hard on a vehicle, even going slow! Lastly, change the bus system so it assists Thornhill better, people who work evening shift are out of luck with the only bus to Thornhill after 6pm is not until past 10, and no bus after 6pm on Saturdays, insufficient and unsafe especially for young women who have to walk at night because of it.
- Thornhill Transit off Queensway could be increased.
- Times they run and where
- Too car focused
- too infrequent, too limited, too expensive
- too many accidents and not enough pedestrian crossings.
- too many gated railway crossings need more overpasses
- Too much traffic dumping down and up Lanfear Hill
- Top & bottom on Lanfear Hill. I live at the bottom of the hill, I see kids waiting as much as 2 minutes to be able to cross before school and after
- Traffic circles have been proven to work in bigger centers. Several intersections would benefit from traffic circles in order to provide continuous traffic flow.
- Traffic light needed at Keith & Kenny
- Train tracks, Keith, Kenny 4 way. Always a train and 4 way too busy.
- Transit service to Thornhill not frequent enough. Too many 4 way stops, side walks and crosswalks not well lit, need a bridge out too
- Truck route doesn't flow, has dangers at rail crossings & the sandy overpass access & exit for heavy haul trucks - which is increasing
- Truck traffic
- TRUCK TRAFFIC THROUGH TOWN, VERY DANGEROUS AS LIKELY A DANGEROUS GOODS ROUTE. THEY SHOULD BE REROUTED DOWN KEITH AVE.
- truck transport through the city
- two-way stop at Kenney and Keith Ave. It makes sense to be a 4-way stop
- Using non-reflective paint for lines; can't see lanes in the dark rainy nights
- Vehicle-centric. Lacking for pedestrians and cyclists
- Vehicular traffic directed on to Lanfear Hill and from Lanfear Hill rabbit hops across residential areas. It should be directed to the intersection of Kalum Lake Road and highway 16. The existing traffic pattern is not safe or kind to the residential areas accommodating the rabbit hopping or cross traffic. I have a huge concern about turning Park Avenue into a collector, unnecessarily directing traffic through some residential area into a congested area downtown. Using highway 16 as a collector/arterial would direct traffic to parking areas in the vicinity of the old CoOp site.
- Very little bike lanes
- Very poor lighting at cross walks
- Very poor lighting at many crosswalks and intersections, both Tim Hortons are incredibly badly set up for both safety and convenience of drivers-I have witnessed several pointless accidents
- We do not accommodate cyclists / discouraging healthier, cleaner, cheaper modes of transportation
- we need another overpass without a doubt
- We urgently need to plan for a second overhead crossing. We need to develop a community that is walkable (ie sidewalks) everywhere.
- Weekends busses should run longer
- Where green lights, plus walk signs are used the public is ignorant or don't watch. Pedestrians could be run over, drivers ignore walk signs.
- where no sidewalk exists on at least one side of the road. Lighting for night use.
- Worst street that needs fixed is Greig! Absolutely horrible! And we need to make Kalum a double lane again!
- Would like more bike lanes and better driver awareness about road sharing and cyclist awareness about where to ride.

Questions 11 and 12: Other Issues and Comments:

- The new traffic lights at the overpass. - Better bike lanes to encourage cycling & reduce dependence on cars
- "Economic Development" There should be a Flying J or similar. Truck service area West End away from residential. This would provide a safe & clean rest for drivers and make highway safer. We are currently one of the worst transport routes in the country for safety, professionalism. Would also provide the hotels at this end of town more customers.
- Creating a more "walkable" Terrace to get people out of the vehicles. 2. Addition of angled parking which will allow for additional sections of landscaping (increase parking and up the "wow" factor).
- Crosswalks painted on a "unmarked" crosswalks. 2. Reducing the downtown speed limit. 3. Additional corner bumpouts installed to slow traffic
- 4 Way stop (off old bridge toward Kitimat etc) need lights!
- 4 way stop at Keith and Kenney
- 4500 block of Soucie and 4600 of Scott need attention
- a dedicated "dangerous goods " route to separate commercial and regular traffic
- A new vehicle overpass would be good, but I think the location should be in town and not as far out as Kalum Lake Rd. In my opinion we don't need an overpass there.
- A pedestrian overpass is a must.
- A Rec centre would be nice
- a traffic roundabout or 4 way stop at Kenney and Keith
- A turning light for the new light system on the overpass.
- A well-signed cycling route for cycle tourists to direct them into and through the downtown core (it's easy to miss the city entirely if you stay on the highway or end up on Keith)
- Add a left turn light to the new intersection on the south end of the overpass
- additional overpass as highest priority
- Airport shuttle bus? Inter-city access -- better passenger rail service
- All gravel roads should be paved
- All pot holes that are big enough to eat cars
- All the intersections are problem due of negligence and lack of judgment from drivers and walkers. Drivers crossing red lights seems to be normal in town and cause stress to others drivers.
- An overpass at Braun St/Kalum Lake is quite distant from downtown and I am not sure how much it would actually be used if in this location.
- Angle parking saves up to 30% more spaces. Can that be considered on Main in some areas as like at Smithers Main Street.
- As our traffic volumes are increasing, limiting traffic flow down town by converting usable vehicle lanes to bike paths is idiotic and would appear to pander to a minority of residents.
- attention needs to be paid to Thomas and Landfear Hill intersection. many times people have been in danger because the curve of the road both ways makes it hard to see, the poles and shrubs block the view for someone turning off Thomas, during peak school hours Thomas is very busy. it often takes 10 to 15 minutes to get off of it at the end of the day and in the morning. some kind of time specific lights or turning rules need to be addressed. there have been many close calls it isn't safe for people crossing either.
- Beautifying Terrace and cleaning up garbage - I know it's being done now - but more is always better
- Best access and sidewalks on and to Keith ave.
- Better crosswalk lighting (ie by Liquor Store - almost hit a pedestrian crossing at night at felt sick to my stomach about it all).
- Better night time lighting
- better painted lines and paving on Lun
- Better shelters at more bus stops. well light.
- better signage through town, remove trees and shrubs blocking views to cars trying to pull out in traffic
- Better snow removal on overpass side walks
- better snow removal for all sidewalks
- Better transit to the airport - perhaps scheduled bus service to/from each flight and buses that hold luggage
- Blind intersection at Kalum and Munthe
- Build a dam / heavy transport road outside of town
- Build for future traffic
- Building a railway overpass at Braun/Kalum should include upgrading Keith as a heavy truck route so truck traffic doesn't go across the Sande overpass
- bus service to airport to coincide with planes
- Bylaw enforcement for parking
- City should blow out driveways on corner lots where traffic is very heavy and plow goes by several times a day

- Clean the snow and gravel!!
- Clean up the downtown core...HIGH PRIORITY
- collisions at Park/Kalum, add warning light and replace four way with a roundabout, dangerous intersection at top of Skeenaview Drive.
- Commercial traffic should move straight through to the new over pass keeping it in the industrial business area of town and increasing the commercial traffic for businesses located there.
- Connecting 4700 block of Davis Ave. so it's a through road
- connectivity of cycling trails
- Consider blocking off entry to Pheasant from Lanfeer, and controlling traffic speed at the base of the hill.
- Continue to improve the cycling infrastructure. Year round cycling is possible in this town, and more people will choose cycling for their commute if they feel it is safe.
- Corner of Park & Kalum seems to be traffic issues / more close calls for accidents
- Cost!!! No new taxes!
- Costs, feasibility, existing accident/near-miss stats
- Cyclist access over new bridges, Sande overpass, and along Eby St between Hwy 16 and Lakelse Ave.
- Cyclist lane on Keith ave as it is highway and scary but no place for bikers. Install more bike lock poles or stations around town to encourage green living. Need more parking at places like hospital, doctors office etc with increase population.
- dangerous intersections like Keith and Kenny
- Dedicated bike lanes
- Density will affect transportation. This needs to be considered. Not only residential density, but also business density. If, for example, we add more business along Lakelse at the roadside in front of the malls, the town becomes more walkable and attractive. Parking density requirements should be diminished for business development. There's nothing wrong with people having to walk a tiny bit further.
- Desperately need routine patching of roads, particularly the depressions created by the natural gas crossings
- Develop a parallel to Hwy 16 (Keith) industrial access road on west side (behind strip mall, A&W, Greyhound - next to CN)
- Development of pedestrian/bike paths separate from roads
- Do not change the four lanes of traffic on Lakelse. There are significant numbers of people come to town on weekends from other communities and we need to accommodate this.
- downtown parking
- Drive through on Lakelse to Tim Hortons is too close to intersection and backs up traffic.
- Drivers need to: not use communication devices. Cyclists/pedestrians alike need reflector tape on clothes available free of charge. Bike manufacturers should be forced to include lights on front / reflectors on back
- Eby by Lakelse and Lazelle is a bottle neck
- Eby street is awkward with two intersections between City Hall and the liquor store. Consider improving the flow of traffic by removing the four way stop.
- Either enforce the rules of bike lanes (motor vehicle act) or abandon them altogether. Motorists regularly park in cycle lanes and with their wheels on the sidewalk. Bike lanes are not rationally assigned. They stop and start with no warning. They are not standard width in many locations, and are too narrow to be safe. They are unpainted for a large portion of the cycling season.
- Eroded road lines desperately need to be repainted, and maintained much better going forward. I've lived here my whole life and I don't even know if some areas are one or two lanes.
- Family/ child-friendly bike routes that connect Ferry Island to town. Beautification of key streets.
- Fix sidewalks and all over downtown! - The centre turning lane and bike lanes on Kalum North of Lazelle was BRILLIANT
- Focusing on future not present
- For all of us to walk and cycle more, a feeling of space from vehicles is necessary for a feeling of being safe on the roadway
- For question 7 the priority changes greatly dependant on where the pedestrian overpass is placed. If you plan on having it down by Braun then it is a no started if you plan on having it at Kalum or slightly east then high.
- Four lane the dudly little bridges
- Frank street crossing
- Frequency of collisions or near misses at specific intersections. Snow removal. The addition of more centre turning lanes (Lakelse Ave, Keith Ave)
- Frequent handy dart size bus trips on all routes for the general public. Transit isn't utilized because some of the routes only go 4 times a day

- Further to #11. While BC courts have ruled camera evidence cannot be used to convict a driver, has it ever been investigated to determine if ICBC could increase insurance rates for vehicles that have consistently exceeded posted speed limits. Surely a vehicle owner should be responsible for how his vehicle is driven. One or two infractions might be forgiven, but not consistent bad behavior.
- Future growth plan for 50 years from now
- Get lights at the intersection into town from Thornhill and Kitimat. Priority #1.
- Good survey. Many dependent items that we cannot comment on without more information, such as costs, existing accident stats, etc.
- Halliwell Avenue
- Have better snow & gravel removal. Make center turn merge lane on Lakelse, have better signage from old bridge to city to get to Hwy 16W via Kalum.
- Have city staff drive around on dark wet evenings and see where street lighting and signage needs to be improved.
- Highway traffic system through town creates a bottleneck of local traffic attempting to cross it. A lot more separation between the two is required.
- Highways to Kitimat need double lane and infrastructure maintenance - with the high volume traffic on this highway the passing lanes and the water pooling need to be addressed.
- Huge focus on active transportation
- Hwy 16 - reroute along/through old mill site or along Keith to a new overpass west of town, so hwy bypass town & Sande overpass
- I believe 2 overpasses are necessary. 1 more vehicle one as described above in your questions and then another pedestrian/cyclist one at Kalum st. Currently foot traffic, often low income, has to walk the several KM detour around the trainyard along Sande overpass just if they would like to walk from Kalum st apartments to Walmart or Superstore. This can be an economic hardship if they are forced to more expensive groceries at Save On/Safeway rather than lower cost alternatives unless they are willing to walk or cut through a dangerous trainyard.
- I don't like the bridge or fourway
- I forgot to mention Kieth and Kenney - that is a very dangerous corner. Thanks for considering the survey.
- I have really hairy balls.
- I like the second overpass proposed location in case of a dangerous goods incident
- I think the bus service is an absolute waste of time as is and should be reworked with smaller more efficient buses and maybe a gondola style tram from the two benches to the downtown.
- I think the new Sandi overpass is working well, especially for the east-west traffic.
- I would be interested to see data related to accidents in intersections. I am surprised to see the Kalum/park Abe intersection included. I feel that the Kalum traffic pattern change really missed the mark and has made that stretch of road more dangerous. Specifically that intersection which sees regular traffic incidents. At the very least increased lighting is required there.
- I would like the city to develop with an emphasis on walking/cycling. I hope the plan will promote health/exercise and children safety. Teenagers walk/bike/skateboard and we need to make the roads safe for them. Also I find that coming out of the mall with pedestrian crossing and the McDonalds drive thru very busy. Drivers often forget to verify the pedestrian crossing as they are so focused on traffic.
- I would love to see some sort of campaign with regards to using turn signals. I have found that most people don't know when they should turn them on.
- I would use the bus if it were available & reliable! (would prefer over other modes)
- I'd like to see Terrace be proactive in continuing to make Terrace Walkable and Bikeable all year long.
- If a new overpass is being considered, alternative locations should be looked at. The proposed location (Braun) does not fit with general traffic flow in town and would provide little benefit over existing overpass. Other safety and traffic flow concerns should be a much higher priority.
- I'm pretty sure it's not involved in this survey but the 4way stop at the scales is always chaos.
- impact of winter conditions ie: snow removal for pedestrians
- Improve between the highway 16&37 intersection and the old bridge as this is the safest way for trucks to get to Queensway
- Improve intersection of Keith and Kenney, ensure Keith remains 3 lanes wide at a MINIMUM
- Improve the exit lane from the overpass to the hospital.
- Improving road line visibility at night, especially during the winter/rain. cat eyes or reflectors needed on road lines.
- Improving the Howe Creek trail with better grading and maintenance.
- Inadequate downtown parking
- increase law enforcement
- Increased bus services

- Installation of Sewer system in McConnell 5200 Block between Thomas and Kalum Lake Rd.
- Intersection at Kenny and Keith
- Intersection of Tetrault St and Keith Ave - being able to turn left onto Keith Ave would improve flow.
- it is important that this plan is finalized before the pending growth happens we are already playing catchup
- It is very difficult to drive down mainstreet in a truck in the outside lane. Trucks have to ride the line or vere into the next lane to avoid hitting parked vehicles.
- It would be GREAT to make it a high priority to install a turning signal light at the intersection near the ambulance station and Skeena Mall! So frustrating trying to make a left hand turn towards the mall, especially on Fridays!
- Kalum & Lazelle could use traffic light due to traffic concern and pedestrian access.
- Kalum Street from Park to the Skeenaview Drive is just wrong in my opinion. Stops, and lights and one lane then not then two ways for each way to go??? just confusing
- keep lines painted regularly! reprogram the lights at the south end of the overpass. fix potholes.
- keith & kenny intersection - make it a 4 way stop
- KEITH & KENNY INTERSECTION - MAKE IT A 4 WAY STOP
- keith and kenny need lights!! Too many chances taken by motorists who dont know the traffic rules
- Keith and Kenny, needs full light controlled instersection, too many accidents and deaths at this location
- Keith and Kenny, needs full light controlled instersection, too many accidents and deaths at this location
- Keith Avenue and Kenney Street is an extremely pedestrian unfriendly intersection. Find it concerning that this intersection is not identified in your survey.
- Keith Avenue West needs to be planned as a light industrial/commercial corridor. The success of this depends on the second overpass
- Keith Estates NCP, Keith-Kenney 4 way or signalized
- Lack of a left turn lanes on Hwy 16 - primarily Sande Overpass to Bridges - travelling East-
- lack of east connection from North to South of town
- Lack of painted lines on streets makes it hard to see at night, especially for those not from terrace, I find I am in the middle of the road just to be sure I am not going to hit a giant hole on the shoulders of some roads
- Lack of sidewalks and streetlights on north eby.
- Lakeelse in front of the mall should be configured similar to the current Kalem st
- Lakelse Ave between Apslay & Kalum St is too narrow
- lakelse avenue wider
- Lakelse driving lanes too narrow for four safe lanes
- Lakelse might be a concern with more traffic, but not yet though.
- Lanfeair Hill traffic should have terminus at Kalum Lake Road and Hwy. Efficiency is not dependent on shortest distances when stop and goes are involved. Lanfeair traffic should be discouraged as it will be very problematic in future.
- Lanfeair traffic should be discouraged. Improved intersection at top will make it worse
- Light at Kenney and Keith.
- Light to switch for pedestrians better improved. Not switch for all direction
- lights at the 4 way stop at hwy's 16 & 37
- lights installed at intersection of Kenney St and Keith St. By Johnsons welding.
- Lights on the North side of the one-way bridge (heading TO thornhill) often do not change in response to traffic presence. I've seen 2 or 3 cycles go by where traffic is only released across the bridge one way. This can be frustrating as there are almost 10 of us who use this route to respond to calls at the Thornhill Fire Dept, and the light not changing can result in significant delays in responding to emergencies from this area.
- lights or traffic circle 12 way stop on highway 16 and 37 south. That four-way stop is a little ridiculous during high traffic moments.
- lots of racism (ie. hollering at bus patrons)
- Love the new intersection at the south end of the overpass and would like to see more roundabouts at awkward intersections.
- Love the new set up on the Sande overpass.
- Main street is too skinny for 4 lanes plus parking so that I find to be a problem. I think that was one of your questions.
- Make the downtown 4600 block of Lakelse, walking traffic only. Kind of like an outdoor mall with cobblestones etc.
- Making more pedestrian controlled intersections and audible crosswalks for visually impaired.
- Many paved roads are past due for resurfacing - Planned new projects and maintenance budgets should ensure existing infastrcuture can be maintained to a good standard.
- More art, places for greenspace and City beautification efforts should be made at boulevards, this should increase permeability and reduce peak rain runoff

- more bike lanes always appreciated
- more bike lanes but am worried they drivers still do not shoulder check when turning. also would like to see the police give more infringement tickets for drivers. drivers are so careless and laxy here they never signal, dont fully stop and drive recklessly.
- More buses and bus times
- More cyclist infrastructure downtown, as well as between the southside and downtown
- More flashing amber lights to alert drivers that the lights are going to change.
- More green areas, benches, covered areas with benches etc., for outdoor events - many wonderful outdoor festivals are spoiled by rain, if we had a way to get areas covered, with seating for our older citizens with possible outdoor heaters, these could possibly be temporary structures which could be stored when not in use
- More green barriers between sidewalks and roads are needed
- More lighting at Cross-walks on north kalum St. Some of these new cross walks have traffic lights, others do not. It's HARD to see pedestrians in the dark, rainy weather.
- More parking so visibility is better when pulling out of certain parking lots.
- More rumble strips at intersections that have a high accident rate.
- more separate turning lanes on Keith ave/ overpasses
- More sidewalks and speed signs. I live on North Eby and it has a large volume of traffic. This is a long section of road and people are always speeding currently there are no speed signs or sidewalk. (Very concerning since there is a school bus drop off at the north end of the street) This is growing concern for many families with small children and pets that live in the area. I think that this road in particular needs some attention. As well maybe adding the end part of North Munroe will help with some of the traffic flow.
- More sidewalks should be constructed (and cleared of snow, can't forget that even though it seems like it is ;))
- More sidewalks, roads with just a cycle lane, like Kenny between Agar and Graham, not enough space to feel safe from cars
- More traffic control, to slow down speeders.
- More trails like the millennium trail!! I walk it almost every day, I love it.
- more upkeep needed such as lines need paint often, potholes need fixing more often. Intersection of Keith and Kenney should have lights. Hall and Keith intersection should have lights.
- my concerns are all mentioned in #3
- My concerns have been mostly been covered in Q10; only other concern is Thomas/Lanfear and Straume due to school traffic and the Lanfear corner limited visibility
- My main concerns are Lanfear and Skeenaview Drive pedestrian path moved to other side, and possibly something different at the corner of Sparks and Halliwell.
- My only concern is speed of other drives.
- Need better illuminated road markings and crosswalks Floyd St needs street light - too dark!
- Need to slow down traffic on Keith ave
- Network connectivity, especially for cyclists
- new pedestrian crosswalk at kalum and loen needs lights. i almost get hit everytime i cross.
- nice survey!
- No parking between lazell and park on sparks makes it difficult to get onto sparks cant see on coming traffic
- none
- none.
- North Eby has a large volume of traffic. It is a growing concern. There is currently no sidewalk as well as no speed signs. People are always speeding this long straight
- Old bridge. Four way
- only one way going north to south over the over pass, again no posted speed limits.
- our mayor and council are doing a good job
- overall good infrastructure - noting the potholes of course!
- Overpass by Evergreen Linking towards walmart.
- Overpass from George Little House area connecting Kalum St. North and South. There are many people who live on the south side who have long distances to walk downtown.
- Overpass needed
- Paint lines on all roads in terrace. Is just about non existant, please do a better job at this.
- painting of lines from park along kalum needs to be corrected, they are confusing now.
- Parking for full size trucks, crewcabs
- Parking!! Create second level parking lot at Safeway or turn the old co-op land into metered parking (this would create an income for the City). Parking is a HUGE issue downtown.
- -paths

- Pedestrian access between south Terrace and horseshoe is inadequate.
- pedestrian crosswalks on Kalum need to be more clearly identified, the one that was removed, the big pole also needs to be removed as people still think there is a cross walk there.
- pedestrian over pass going across the tracks by kalum would probably be a good idea, theres always people walking across there.
- Pedestrian overpass and cyclists over Kalum
- Pedestrian overpass from downtown to the Walmart/A&W area. Those areas will be developing even more, with poor transit more and more people will be attempting to cross over by foot.
- Pedestrian walkway at the end of kalum. Lighting up of crosswalks
- People bridge over the tracks should be higher up. One by Sears another by Monroe. Another down by Canadian Tire.
- People should get fines for jay walking, as Terrace is the worst place for people jay walking at anytime. Please light up all crosswalks better.
- physical road improvement
- please install traffic lights at the corner of keith and kenny.it's a very dangerous intersection!
- Poor planning & execution over the years has caused many of these problems.
- Poor survey: re#7, you should indicate the potential location for the pedestrian overpass - I am assuming you mean at Kalum street. Re 1 - 3, the opinions should be on the different aspects of the "transportation system".
- Priority with having second overpass would increase if rail traffic significantly increases.
- Put a lefthand turn light turning left off Keith @ the overpass to match lefthand turn signal coming up from east to overpass.
- put lights at Kenney st. and Keith Ave.
- put money into traffic education; increase camera presence in many of the above mentioned intersections, reduce speed limits, public transport stops and crossings need to be given greater attention to limit accidents
- Put sand on the road rather than rocks during winter
- Putting a pedestrian overpass at Kalum Street / CN tracks would get more foot tranfic through that area.
- quick thinking about the few rich people who actually want to bike to work. think of the people who MUST walk everywhere. also do not remove a lane from Lakelse Ave (Main street) -if you do this you are crazy and should not be running our city. what you did on Kalum is bad enough. I have seen 1 bike on there using the bike lane. The people who work at NHA Public Health who pushed the bike lanes - don't even bike to work and they live only a few blocks away - THEY DRIVE. Ask yourself how many city councilors bike to work or to your meetings?!
- Railroad crossings at each of the intersections heading to the south side
- railing along the SE sidewalk of the overpass
- RE: #9 - I'd be concerned about re-configuring Lakelse too much when we're expecting so much growth. At some point, downtown will be too crowded and Lakelse would need to be re-expanded. Look into turning the 4600 block of Lakelse into pedestrian only access and fix Keith Avenue as a main artery street. Would serve to create a beautiful outdoor mall / tourist strip on Lakelse, and Greig is a terrible road to drive on (potholes) and could be a main artery instead of that one block of Lakelse.
- Reduction of traffic in residential areas
- repair broken/old bike racks around town (especially the post and ring ones on Lakelse Ave), and add more!; trail building initiative; bike lane on Kalum st should continue and not just disappear halfway down the street
- Repair of pot holes - repave street ie. Davis Ave 4800 Loen 4800
- repave bad roads such as beach street. Reprogram lights at south end of overpass for left turning from Keith going north. why bother with bike lanes when no one uses them? turn Lakelse into 2 lanes in front of both malls. perhaps with angle parking.
- Resurfacing roads and building sidewalks on busy streets around schools
- Revive the bussiness area near the Terrace Hotel.
- road maintenance - street lighting
- road maintenance, enforcement in the H.Shoe of speed during weekend evenings. Soucie Ave in Particular
- Round about are a good option to consider as is a larger bridge to replace the one way bridge
- Round-about at Hwy 16 & 37. Pedestrian and bike paths that encourage these modes of transport by not just making them safe and accessible, but also enjoyable.
- Safe, clearly marked crosswalks are needed.
- Separate bike lanes at dangerous areas are the only way that women, children, the elderly and those with disabilities can have adequate access to cycling as a transport option.
- set of lights at the 4 way by the scales. No body knows how to use a stop sign anymore.
- Sewer should be extended all the way down McConnel Ave

- Should be linked to Terrace OCP - why keep building new neighbourhoods on the bench when access to the bench is inadequate?
- Side walks plowed in winter
- Sidewalk needed from Rest Inn to entrance to Twin River. Many, many people walking this route over Old bridge with lots of traffic. They are facing the wrong way but opposite side of road too narrow.
- sidewalks for safe pedestrian traffic to school on scott & sparks from kalum to eby
- Sidewalks please! Make it feel like it's not a crime to walk. Cars don't own our transportation network.
- Similar to the top of Lanfear hill, the top of Skeenaview Drive should have a crosswalk.
- Snow clearing should not block driveways.
- So happy to hear about the potential pedestrian overpass!
- Some bus drivers don't stop at the stop when buzzed to stop
- some of the ideas presented here are delusional, money wasting make work projects
- Some public spaces should consider electric charging stations, or private enterprise should be approached by the municipality to accommodate charging stations, similar to what the Skeena Mall has implemented in their parking lot.
- sound barriers along lanfear hill need to be installed. the home owners are subject to loud vehicles every minute of the day.
- Speed in school zones and re-routing heavy traffic around these zones
- Speed restricting devices such as speed bumps in problem areas.
- speed zones. one way streets
- spending lots of money on stuff people already know there are problems
- Stairs to get from horseshoe to bench halfway between lanfear and kalum
- STOP TAKING AWAY LANES
- Stop taking away lanes, downsizing lane sizes already and adding a suicide lane was one of the dumbest things the city could have done, it has created problems already and needs to be put back.
- Stop wasting money on millennium trail and focus on giving tax payers and youths a community inspired walking and cycling infrastructure
- streetlights at corner of Keith and Kenny
- successful communities encourage pedestrian traffic. Sidewalks should be a priority. They need to be upgraded, connected and a requirement for any new developments
- Terrace community is too much of a driving friendly community, needs to be a walking friendly community. I dislike seeing our main street (lakelse) having parking lots as frontage property (ie Skeena mall, safeway). you would never see this in another city.
- Terrace has the potential to be a very walkable and bikable city nearly year-round given our climate and the relatively concentrated services and housing. Though the community is very vehicle reliant now, I hope that future trends are thoroughly researched so that investment in pedestrian and cycling infrastructure reflects future demand.
- Terrace is great!
- Terrace is very badly designed, for pedestrians and vehicles; too many blind spots, too many tight corners, too many visual restrictions that put pedestrians and cyclists at risk. Oftentimes, this could be addressed without major road works (e.g. yellow lines to prevent parking close to intersections); reduce speed with bumps or road indentions as is done in Europe to curb speed; try not to reinvent the wheel, but look to other places that have already done the work! Let's not pretend these issues are unique to this town; what is unique that we are far behind in these developments, but as long as planners insist on thinking 'cars' rather than people we're going to fail in providing a progressive and successful town traffic flow
- Thanks for your time.
- The 4 way stop
- The 4 way stop at the weigh scales - major congestion with truck traffic - people stop all the time to let trucks go which is a safety concern
- The additional lanes on the overpass have made the streets far more effective and safe. The four way coming into Terrace from Kitimat needs to be upgraded. Two priority areas in the line of work I do would be; Keith and Kenny for an overpass at the railway junction, and the main four way coming into town from Kitimat.
- The amount of potholes that come up in major intersections
- The bottom of lanfear st where there is the Howe Creek trail. Many kids use the trail from the bench to go to school at Caledonia and SMS. There is no safe way to cross there. it is worse in winter with no sidewalks.
- The bus schedule needs to be changed to involve more hours. Also making our town more accessible for biking from upper Thornhill to downtown terrace.
- The choking off of traffic with widened sidewalks downtown, and with curbs doing in parking lots ??
- the city has been talking about a second overpass forever....it's time to take action

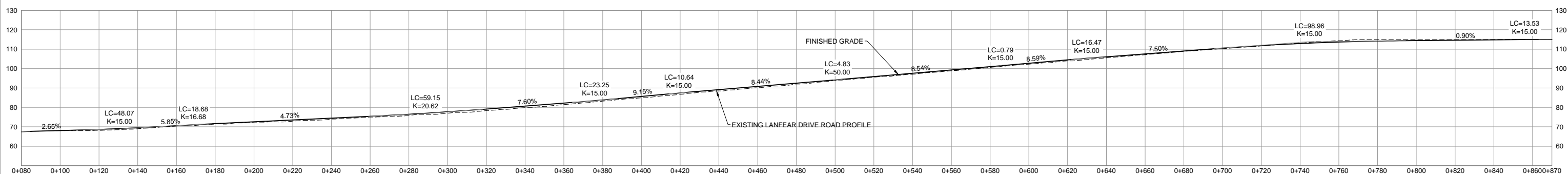
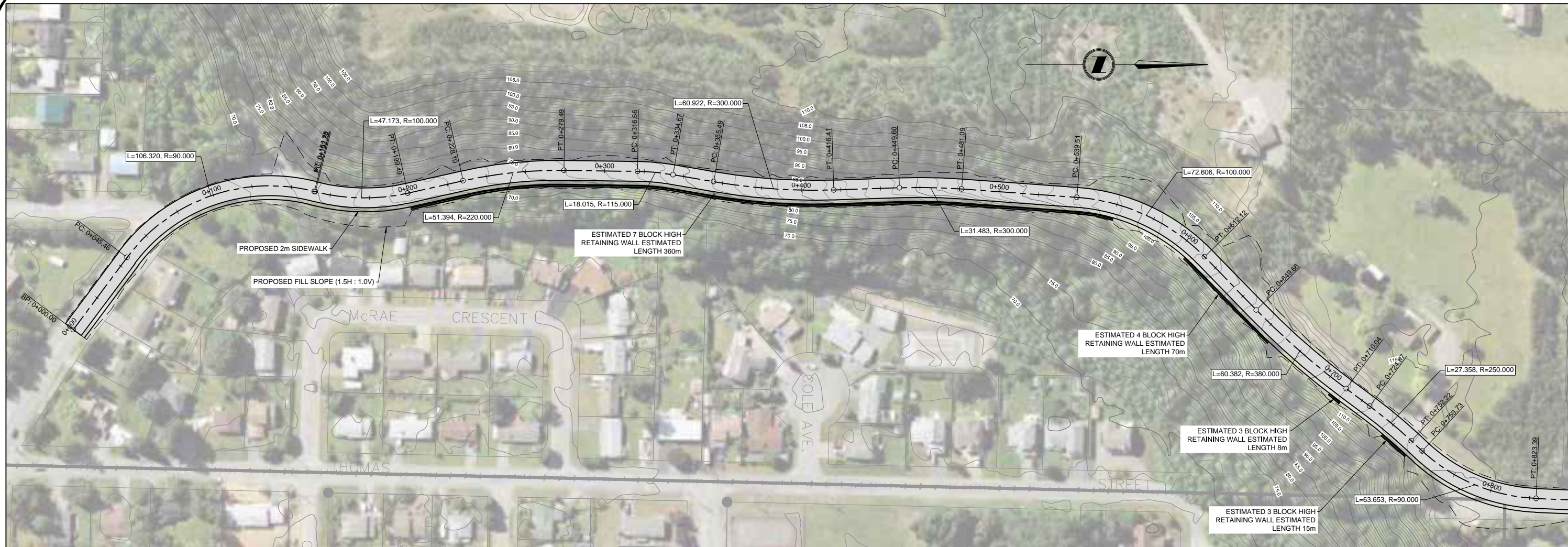
- The city of Terrace does a fairly good job on snow removal, i often tell other people that even though our average snow fall is 12 feet plus per year you do not really notice because the city and people know what to do with it.
- The concept of a overpass at Braun Kalum Lake Road is wrong headed and does not solve the existing issues. Should be off the base of Lanfear where traffic will automatically go.
- The cross walk lights should be longer they dont give you enough time to go across
- The crossing in front of Trigos clothing store is dangerous, lighting should be installed
- The double lanes in the core downtown main street are narrow; this is a safety hazard. A lot of the time these lanes are used as single lanes due to inability for larger vehicles to use the outside lane when cars are parked. Also a dangerous situation when parked vehicles open their driver's side doors when traffic is coming.
- The four lanes on Lakelse Ave in downtown do not offer four lanes when larger vehicles are parked along the curb so if you want to open up a cycling lane will have to prohibit parking on the road
- The intersection in front of Trigos, Moose Studios (Lazelle Intersection).
- The intersection of Keith and Kenney is a very high priority for upgrade to reduce safety concerns. A traffic lioght or alternate solution is required to enhance traffic flow in an efficient manner
- The intersection of Thomas & the bottom of landfear hill is very busy 9am & 3pm & it is very difficult to turn in either direction when you are going South on Thomas.
- The lack of adequate parking and also proper sidewalks in school route. Also plowing of sidewalks in school routes.
- The overpass is dangerous to cycle over. Drivers are not used to sharing the road with bikes. Riding on the sidewalk feels dangerous because semi-trucks drive close to the sidewalk and if you were to fall off, you would die. Many people go to the hospital each day, but there is no convenient way to cycle/walk there, and there is no left turn off of tetrault street to get back to town. I would like a pedestrian/bike overpass near kalum road to the south side of Terrace.
- the potholes on Munroe street (between Straume and Highway 16) are out of control!!
- The power the bicycle mafia seems to wield in this town is excessive
- The quick road patch stuff looks terrible and does not last, spend the money fix it the right way
- The redesign of the south end of the overpass was brilliant! Now we (drivers and pedestrians) have to unlearn years of learned behaviours.
- The safety at Lazelle and Kalum should be a priority as well
- The stability of Lanfear hill
- The strange intersection on Park to get to the Medical Bldg in difficult. I don't know why, but it is so convoluted to try and get to the Medical Centre in a more direct way.
- The town should allow more cab companies in town, cabs take too long and competition is a good thing.
- The traffic control light at Highway 16 and Feeney Avenue needs to be changed. Highway 16 traffic currently has to stop too soon for vehicles wish to access Highway 16 off Feeney. Vehicles wishing to access Highway 16 should have a longer wait time before the light changes, so the main traffic can continue to flow. Stopping the main traffic to permit one or two vehicles to leave Walmart is incorrect in my opinion. The likely location of a new vehicle overpass over the railway would be at Highway 16 and Kenney Street.
- There are kids having to walk on the roads to get to school as there are no sidewalks.also ferry island desperately needs a traffic/pedestrian light. If anybody from city council has walked the new bridge the sidewalk is on the opposite side of ferry island. Legally there is no way to 'walk'to ferry island with out J walking.
- There are other intersections that are dangerous/unsafe. The ones listed are flow issues or inconvenient.
- There is not enogh cyclists path
- There must be better methods of lane marking out there that don't wear off as fast.
- There needs to be an overpass on Keith Avenue and Kenny, as the railroad is always creating major time delays and safety issues. This is a high priority area.
- There should be a pedestrian/cyclist overpass on the crossing by Copperside/SD#82
- There should be a recognition that cars/ small trucks need to be slowed. Our roads are narrow and there are often others co-using them ie pedestrians and bikes. There are also parked cars contend with. While solutions are not cheap they are cheaper than policing costs and accident costs (which need to be factored in). In my travels I like the Vancouver model in the residential areas: more stop signs, small residential roundabouts , and very wide speed bumps. These work positively to achieve the goal. People need to do what all the disappearing white lines, electronic speed signs and tickets don't do and that is positively control traffic.
- there should be almost no town house or condo towers built on the bench due to the poor road lay out / choke points. all high density housing should be placed near the downtown core to minimize the need for driving and optimize our potential for greenhouse gas reduction

- Think more about cyclists safety
- This survey is supported - thanks for asking!
- thomas and kenney, keith ave
- Thomas to Lanfear bottom of hill school traffic
- Tim Hortons congestion. Centre turning lane and bike lane the whole length of Lakelse, Legion to Eby. Extend Center lane and bike lanes on Kalum from Park to Greg .
- timing of pedestrian walk ways are important so that pedestrians are not standing around facing the elements as long
- Too many speeders especially at Kalum & Lakelse on front of Happy Gang
- Top of Skeenaview Drive safety, 4-way stop (thornhill) help, new bridge backup help
- Town was apparently surveyed by alcoholics.
- traffic calming measures in residential streets being used as through-roads (scott ave. for example)
- Traffic flow across one-way bridge
- Traffic flow from the bench, through downtown, and across the tracks is the biggest challenge for Terrace at this time. It appears the major problem areas are identified in this study and should be prioritized to create safe and efficient routes for all road users.
- Traffic noise, is quite unpleasant for both pedestrians and residents along busy routes. Noise is often generated by speeding.
- Transit increase to Gitau & Kulsapai / Queensway
- Transportation infrastructure (car, cyclist, and pedestrian) should be basic priorities of a town council. I'd readily pay higher taxes to see positive changes here. Much work is needed. Tourism could also benefit.
- Uber, Lyft, etc. will likely reduce the load on public transit, making a frequent bus schedule impossible. Make biking possible for the physically able, hope for Uber elsewhere.
- Upgrade the crosswalks - incorporate a LGBTQ crosswalk - let's show the world that we are an inclusive community :)
- Upgrades to more city streets, and more side walks
- Vancouver had a system @ hi density intersections & pedestrians got green light in all directions - worked well at the time
- vehicles parked on sidewalks blocking them.
- Walking or road overpass linking evergreen st towards walmart.
- we are in need of an overpass but where they are looking is NOT right. They should be looking over by school street by J&F it would alleviate some downtown traffic.
- We could do a lot more to encourage more non vehicular transit. As a avid cyclist (both for transportation and recreation), I have to say that drivers should be ticketed more often and we need more places to lock bikes up.
- We need sidewalks. Large streets allow traffic to exceed the speed limits. Walking/biking trails crossing the tracks and the river should be a priority. The path that runs from Soucie to Munroe? through the small canyon should be formalized and protected if the land is currently owned by the city as it provides an excellent connection between neighbourhoods and many people use the trail for recreation and access to a unique ecosystem in town.
- we need to encourage / accommodate other modes of transportation (walking/biking/blading/skating)
- When you come towards town from Canadian Tire, there are flashing lights that warn when the light is going to change orange. There should be more of these, if you go South, they are everywhere and help with speed and people running lights.
- Width of traffic lanes, parking of wide vehicles obstructing traffic, 4500 Block of Lakelse is a bottleneck
- Winter maintenance



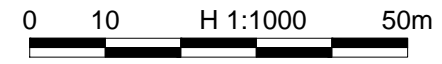
APPENDIX D

LANFEAR DRIVE WIDENING



FOR DISCUSSION PURPOSES ONLY

10.0m ROADWAY - LANFEARD DRIVE Concept
 DUAL BIKE LANE WITH 2m SIDEWALK





McElhanney